

Volume 7
Number S6
September 2023

JBMR[®] PLUS

Open Access

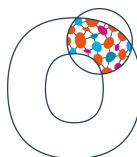
**Abstracts from the Osteoporosis 2023 Conference,
Royal Osteoporosis Society, September 13-14,
University of Manchester, UK**

OSTEOPOROSIS CONFERENCE 2023



**Royal
Osteoporosis
Society**

Better bone health for everybody



**Osteoporosis &
Bone Health
Academy**

WILEY

Published monthly by
The American Society for Bone and Mineral Research



The Royal Osteoporosis Society (ROS) are the UK's largest national charity dedicated to improving bone health and beating osteoporosis. ROS equip people with practical information and support to take action on their bone health. Working with healthcare professionals and policy-makers, ROS influence and shape policy and practice at every level. ROS also drive the research and development of new treatments, to beat osteoporosis.

Back after a five-year hiatus, ROS held the UK's biggest conference on osteoporosis and bone health in Manchester. Bringing together a multidisciplinary audience of over 500 healthcare professionals, Osteoporosis 2023 showcased the latest in research and advances in the diagnosis, treatment and management of patients.

Osteoporosis continues to be one of the most urgent public health crises of the modern era and this conference aimed to help understand what best practice care looks like, whilst helping healthcare professionals deliver this. Together we can prevent hundreds of thousands of avoidable fractures, extend quality of life for millions of people, and make a game-changing difference for our NHS.

Professor Neil Gittoes, Chair of the Board of Trustees at the Royal Osteoporosis Society: It was a delight and honour to welcome back established colleagues and friends to the unique atmosphere and buzz of an 'in person' Royal Osteoporosis Society Conference. Likewise, the anticipation of making new connections and relationships in the field of osteoporosis adds to the excitement of us all getting together in Manchester.

While there continues to be exciting developments in our field of osteoporosis and fracture prevention, all-around us there are transparent reminders that we have much work to do as a community to help address inequalities in providing the best fracture prevention care to all our patients. From influencing national policy makers to redressing the postcode lottery around delivery of effective fracture liaison services to working at integrated care board level with hospitals and primary care to ensure the best treatments are available for all. Throughout our Conference there was a firm focus on equity of care delivery. Over the course of our meeting we shared learning and understanding to work towards providing uniformly the highest standards of care for all irrespective of characteristics.

Invited Speaker Abstracts	8
UNDERSTANDING BMD AND DXA MEASUREMENTS.....	9
ANABOLIC THERAPY FOR OSTEOPOROSIS, WHEN, WHO AND WHAT WITH?.....	10
BONE HEALTH ESSENTIALS: VERTEBRAL FRACTURES - WHO TO X-RAY	11
OSTEOPOROSIS PATIENT EDUCATION.....	12
BONE HEALTH IN INFLAMMATORY CONDITIONS	13
INTERNATIONAL PERSPECTIVES ON NUTRITION AND BONE HEALTH	14
BONE HEALTH ESSENTIALS: MANAGEMENT IN DIVERSE GROUPS – OVERVIEW OF TREATMENT OPTIONS.....	15
INVESTIGATING FOR CAUSES OF SECONDARY OSTEOPOROSIS	16
'ONCE FOR SCOTLAND' APPROACH TO FRACTURE CARE: SCOTTISH HIP FRACTURE AUDIT, THE NEW BONE HEALTH POST HIP FRACTURE PATHWAY AND PROPOSED FLS AUDIT FOR SCOTLAND	17
BONE HEALTH IN THE GENDER DIVERSE POPULATION	18
BONE HEALTH ESSENTIALS: INVESTIGATIONS - MAKING THE BEST USE OF BONE TURNOVER MARKERS.....	19
THERAPEUTIC DILEMMAS: GREY AREAS - ROMOSUZUMAB AND CARDIOVASCULAR RISK.....	20
YOUNG PEOPLE- AROMATASE INHIBITORS/EATING DISORDERS	21
SPEAKING OUR LANGUAGE - PATIENT ENGAGEMENT	22
THE CLINICAL RELEVANCE OF MICRONUTRIENTS ON MUSCLE AND BONE	23
QUALITY CARE FOR EVERYBODY - HIP FRACTURE: EQUITY IN CARE.....	24
“QUALITY CARE FOR EVERYBODY – FRACTURE LIAISON SERVICE: ALL WALES APPROACH”.....	25
MANAGING eGFR AND BONE.....	26
MANAGEMENT OF SYMPTOMATIC VERTEBRAL FRACTURES – NEW CONSENSUS GUIDANCE PRACTICE POINTS.....	27
BONE HEALTH ESSENTIALS: MANAGEMENT IN DIVERSE GROUPS - MANAGEMENT IN THE FRAIL OLDER ADULT AND COGNITIVELY IMPAIRED.....	28
ROS 2023 Orals	29
FRACTURE RISK IS SIGNIFICANTLY ASSOCIATED WITH CARDIOVASCULAR RISK IN PATIENTS WHO QUALIFY FOR ROMOSUZUMAB TREATMENT	30
PREGNANCY ASSOCIATED OSTEOPOROSIS IS ASSOCIATED WITH SUBSTANTIALLY REDUCED QUALITY OF LIFE IN THE SHORT AND LONG TERM.....	32
AN UNUSUAL CASE OF EXTREMELY ELEVATED ALKALINE PHOSPHATASE IN AN ADULT	33
EFFECT OF FIBROBLAST GROWTH FACTOR (FGF) 19 AND 21 ON HIP STRENGTH IN POST-MENOPAUSAL OSTEOPOROSIS (PMO)	34
PRIOR ANTIRESORPTIVE TREATMENT REDUCES LUMBAR SPINE BMD RESPONSE TO ROMOSUZUMAB IN CAUCASIAN POSTMENOPAUSAL WOMEN WITH SEVERE OSTEOPOROSIS.....	35
TYPES OF PATIENTS REFERRED TO A MULTIDISCIPLINARY ADULT RARE BONE DISEASE CLINIC: 4-YEAR EXPERIENCE	36
PATIENT RECOVERY FOLLOWING HIP FRACTURE IS ASSOCIATED WITH MULTIPLE	

MODIFIABLE COMPONENTS OF HOSPITAL SERVICE DELIVERY IN ENGLAND AND WALES: THE REDUCE RECORD-LINKAGE COHORT STUDY	38
RADIOLOGY REPORTING OF INCIDENTAL OSTEOPOROTIC VERTEBRAL FRACTURES COMPUTED TOMOGRAPHY STUDIES: RESULTS OF UK NATIONAL RE-AUDIT	39
REDSTAR FLS – AN INNOVATIVE DIGITAL SOLUTION FOR FRACTURE LIAISON SERVICES IN NHS GREATER GLASGOW AND CLYDE.....	40
PRIMARY CARE BASED OPTIMISATION OF ANTI-OSTEOPOROSIS MEDICATION ADHERENCE: GRASP OSTEOPOROSIS	41
ASSESSMENT AND MANAGEMENT OF FRACTURE RISK IN MEN WITH PROSTATE CANCER TAKING ANDROGEN DEPRIVATION THERAPY: A RETROSPECTIVE OBSERVATIONAL PRIMARY CARE DATABASE STUDY	43
IMPLEMENTATION OF A VERTEBRAL FRACTURE PATHWAY TO IMPLEMENT ROMOSUZUMAB	44
IMPACT OF A SPECIALIST NURSE TELEPHONE HELPLINE ON INTENTION TO INITIATE OR CONTINUE OSTEOPOROSIS MEDICATION	45
DEVELOPMENT OF AN INNOVATIVE DIGITAL QUESTIONNAIRE TO SCREEN ADULTS FOR RISKS OF OSTEOPOROSIS AND FALLS IN PRIMARY CARE BY A FIRST CONTACT PHYSIOTHERAPIST	46
THE 4% FAT ERROR: A POTENTIAL SOURCE OF ERROR ON DXA SCANS.....	47
QUALITY IMPROVEMENT INITIATIVES TO IDENTIFY AND MANAGE FRAGILITY FRACTURES IN A WELSH HEALTH BOARD	48
IS RADIOGRAPHIC OSTEOPENIA A VALID INDICATION FOR BONE DENSITOMETRY?	49
DXA REPORTING IN MEN: EFFECT OF CHOICE OF REFERENCE DATABASE	50
AN AUDIT OF BISPHOSPHONATE PRESCRIBING AND MONITORING IN PRIMARY CARE	51
PATIENT REPORTED EXERCISE ACTIVITY AND PHYSIOTHERAPY INPUT FOLLOWING FRAGILITY FRACTURE PRE- AND POST-PANDEMIC: EVALUATION OF COVID-19 IMPACTS USING FRACTURE LIAISON SERVICE CLINIC DATA.....	52
ROS 2023 Posters	53
THE 4% FAT ERROR: A POTENTIAL SOURCE OF ERROR ON DXA SCANS.....	54
AN UNUSUAL CASE OF EXTREMELY ELEVATED ALKALINE PHOSPHATASE IN AN ADULT	55
VIDEO: CONSIDERING BONE HEALTH AND FRAGILITY IN MOVING AND HANDLING ACTIVITIES	56
WITHDRAWN	57
TYPES OF PATIENTS REFERRED TO A MULTIDISCIPLINARY ADULT RARE BONE DISEASE CLINIC: 4-YEAR EXPERIENCE	58
IS RADIOGRAPHIC OSTEOPENIA A VALID INDICATION FOR BONE DENSITOMETRY?	60
BONE HEALTH IN ADULT PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY (DMD).....	61
FRAILTY, FALLS AND FRACTURE RISK IN OLDER PEOPLE LIVING WITH HIV; FINDINGS FROM AN INTEGRATED HIV-GERIATRIC CLINIC IN ZIMBABWE	62
EFFECTIVENESS OF A NATIONAL DXA TRAINING PROGRAMME FOR QUALITY	

BMD MEASUREMENTS	63
IMPROVING PROMOTION OF PHYSICAL ACTIVITY BY PHYSIOTHERAPISTS, WITH PARTICULAR REFERENCE TO EXERCISE FOR HEALTHY BONES	64
DXA REPORTING IN MEN: EFFECT OF CHOICE OF REFERENCE DATABASE	65
DEVELOPMENT OF AN INNOVATIVE DIGITAL QUESTIONNAIRE TO SCREEN ADULTS FOR RISKS OF OSTEOPOROSIS AND FALLS IN PRIMARY CARE BY A FIRST CONTACT PHYSIOTHERAPIST	66
IMPROVING UNDERSTANDING OF PATIENT TREATMENT DURATION AND ADHERENCE USING A STRUCTURED PRO-FORMA DURING DUAL-X-RAY ABSORPTIOMETRY SCAN VISITS.....	67
A QUALITY IMPROVEMENT PROJECT ON PATIENTS' ATTITUDES TOWARDS TELEPHONE CONSULTATIONS IN AN OSTEOPOROSIS CLINIC	68
IMPLEMENTATION OF A VERTEBRAL FRACTURE PATHWAY TO IMPLEMENT ROMOSOZUMAB	69
ASSESSMENT AND MANAGEMENT OF FRACTURE RISK IN MEN WITH PROSTATE CANCER TAKING ANDROGEN DEPRIVATION THERAPY: A RETROSPECTIVE OBSERVATIONAL PRIMARY CARE DATABASE STUDY	70
EVALUATION OF A NURSE-LED BONE HEALTH PATIENT EDUCATION WORKSHOP	71
ASSOCIATION OF BONE MINERAL DENSITY-DEFINED DIAGNOSIS OF OSTEOPOROSIS WITH LIKELIHOOD OF TAKING OSTEOPOROSIS DRUG TREATMENTS IN A SINGLE FRACTURE LIAISON SERVICE.....	72
UK MULTI CENTRE DXA REPORTING AUDIT- EFFECTIVENESS OF TRAINING ON ATTAINING STANDARDS.....	74
OSTEOPOROSIS VERTEBRAL FRACTURES – ASSESSMENT AND INTERVENTION USING FRAX TOOL	75
INADEQUACIES IN DXA AND REPORTING TRAINING: A UK WIDE AUDIT	76
VERTEBRAL FRACTURE REPORTING AND DIAGNOSIS OF OSTEOPOROSIS PRIOR TO HIP FRACTURE - A MISSED OPPORTUNITY?.....	77
QUALITY IMPROVEMENT INITIATIVES TO IDENTIFY AND MANAGE FRAGILITY FRACTURES IN A WELSH HEALTH BOARD	78
SERVICE EVALUATION: PATIENT EXPERIENCE OF DXA SCANNING IN A LARGE DISTRICT GENERAL HOSPITAL	79
UK-WIDE DXA REPORTING QUALITY BENCHMARK AUDIT.....	80
REVIEW OF THE DENOSUMAB PATHWAY BETWEEN THE SECONDARY CARE AND INTERMEDIATE CARE	81
EXPERIENCE OF THE ADMINISTRATION OF FIRST DOSE IV ZOLEDRONATE AT QUEEN ELIZABETH HOSPITAL	82
REVIEWING THE RISK ASSOCIATED WITH LONG TERM ORAL CORTICOSTEROID THERAPY IN RHEUMATOLOGY	83
BENEFITS OF DENOSUMAB SELF-ADMINISTRATION.....	84
BONE HEALTH ASSESSMENT AMONG WOMEN WITH PREMATURE OVARIAN INSUFFICIENCY	85
AN AUDIT OF BISPHOSPHONATE PRESCRIBING AND MONITORING IN PRIMARY CARE	86
THE UTILITY OF MEASURING MARKERS OF BONE TURNOVER IN A METABOLIC	

BONE SERVICE	87
A COMPARATIVE ANALYSIS OF OPPORTUNISTICALLY IDENTIFIED VERTEBRAL FRACTURES USING CT SCANS ACROSS FOUR NHS ORGANISATIONS. DO PATIENTS SURVIVE LONG ENOUGH TO POTENTIALLY BENEFIT FROM FRACTURE PREVENTION INTERVENTIONS?	88
RADIOLOGY REPORTING OF INCIDENTAL OSTEOPOROTIC VERTEBRAL FRACTURES COMPUTED TOMOGRAPHY STUDIES: RESULTS OF UK NATIONAL RE-AUDIT	90
FRACTURE RISK ASSESSMENT IN PATIENTS UNDERGOING ELECTIVE ARTHROPLASTY: A PILOT STUDY	91
KNOWLEDGE AND CONSIDERATION OF OSTEOPOROSIS AMONGST PHYSIOTHERAPISTS NOT WORKING IN A SPECIALIST OSTEOPOROSIS ROLE	92
WHO ACTUALLY RECEIVES BONE PROTECTION AFTER A FRAGILITY FRACTURE? AN ANALYSIS OF DATA FROM THE FALLS AND FRAGILITY FRACTURE AUDIT PROGRAMME IN WALES	93
PATIENT REPORTED EXERCISE ACTIVITY AND PHYSIOTHERAPY INPUT FOLLOWING FRAGILITY FRACTURE PRE- AND POST-PANDEMIC: EVALUATION OF COVID-19 IMPACTS USING FRACTURE LIAISON SERVICE CLINIC DATA.....	94
IMPACT OF A SPECIALIST NURSE TELEPHONE HELPLINE ON INTENTION TO INITIATE OR CONTINUE OSTEOPOROSIS MEDICATION	95
CHARACTERISTICS OF CALLERS CONTACTING A NATION-WIDE OSTEOPOROSIS SPECIALIST NURSE TELEPHONE HELPLINE	96
PRINT AND ONLINE NEWS REPRESENTATIONS OF OSTEOPOROSIS AND ITS TREATMENT IN THE UK: A FRAMING ANALYSIS	97
AUDIENCE RECEPTION OF MEDIA MESSAGES ABOUT OSTEOPOROSIS AND ITS TREATMENT: A FOCUS GROUP STUDY	98
RADIAL BONE DENSITY MEASUREMENT AS A PREDICTOR OF OSTEOPOROSIS AND 10- YEAR FRACTURE RISK AT THE FEMORAL NECK – AN OPTION FOR TREATMENT DECISIONS WHERE FEMORAL NECK AREAL BONE MINERAL DENSITY CANNOT BE OBTAINED?.....	99
EFFECT OF FIBROBLAST GROWTH FACTOR (FGF) 19 AND 21 ON HIP STRENGTH IN POST-MENOPAUSAL OSTEOPOROSIS (PMO)	100
WITHDRAWN	101
THE IMPACT OF COVID-19 ON DUAL-ENERGY X-RAY ABSORPTIOMETRY SERVICES IN ENGLAND	102
ZOLEDRONATE AS SECONDARY PREVENTION AFTER HIP FRACTURE — HOW BIG IS THE MISSED OPPORTUNITY?	103
MAPPING THE COVID-19 PANDEMIC IN THE UK — USING DATA FROM THE NATIONAL HIP FRACTURE DATABASE (NHFD)	104
PRIMARY CARE PRACTITIONERS' VIEWS ON BARRIERS AND ENABLERS OF OSTEOPOROSIS CARE: A SCOPING REVIEW	105
KNOWLEDGE MOBILISATION TO ADDRESS THE OSTEOPOROSIS CARE GAP USING A COMMUNITY OF PRACTICE APPROACH	106
DEVELOPMENT OF A TRIAL INTERVENTION OF PHYSIOTHERAPY EXERCISE REHABILITATION WITH INTEGRATED SUPPORT FOR EXERCISE ADHERENCE FOR PEOPLE WITH VERTEBRAL FRAGILITY FRACTURES AND BACK PAIN	107
THE CORRELATION BETWEEN BODY MASS INDEX (BMI) AND BONE MINERAL DENSITY (BMD) BY DUAL-ENERGY X-RAY ABSORPTIOMETRY (DXA) AND RADIO	

FREQUENCY MULTI-SPECTROMETRY (REMS) SCANNERS	108
BARRIERS AND FACILITATORS OF WEIGHT BEARING AFTER HIP FRACTURE SURGERY AMONG OLDER ADULTS. A SCOPING REVIEW	109
OSTEOPOROSIS AND FRACTURE AS RISK FACTORS FOR SELF-HARM AND SUICIDE: A SYSTEMATIC REVIEW AND META-ANALYSIS	110
“THIS IS MY TEAM”: LESSONS LEARNT FROM PATIENT AND PUBLIC INVOLVEMENT IN THE IFRAP STUDY	111
PATIENT INTERACTION IN UK FRACTURE LIAISON SERVICES: RESULTS FROM THE IFRAP NATIONAL SURVEY	113
REDSTAR FLS – AN INNOVATIVE DIGITAL SOLUTION FOR FRACTURE LIAISON SERVICES IN NHS GREATER GLASGOW AND CLYDE.....	115
IMPACTS OF AN ETHNOGRAPHIC STUDY OF EXPERIENCES OF FALLS IN DOMESTIC SETTINGS AND THE USE OF AMBULANCE SERVICES	116
REMOTE VERSUS FACE TO FACE USE OF A CLINICAL DECISION TOOL TO HELP IDENTIFY CURRENT RISK OF OSTEOPOROTIC VERTEBRAL FRACTURE IN MEN WITH BACK PAIN	117
OSTEOPOROSIS: WHAT DO MEN KNOW? A SYSTEMATIC REVIEW AND EVIDENCE SYNTHESIS	118
CO-MANAGED CARE PROTOCOL FOR ELDERLY PATIENTS WITH HIP FRACTURES: EARLY OSTEOPOROSIS TREATMENT AND REDUCED LONG-TERM COSTS	119
WOMEN’S EXPERIENCE OF LIVING WITH PREGNANCY AND LACTATION ASSOCIATED OSTEOPOROSIS IN THE UNITED KINGDOM - A QUALITATIVE INTERVIEW STUDY	120
BONE HEALTH ASSESSMENT IN MEN AND WOMEN WITH RISK FACTORS FOR FRAGILITY FRACTURES.....	121
OSTEOPOROSIS IN MEN: RISK FACTORS AND INDICATIONS FOR PARENTERAL TREATMENT.....	122
SHORT-TERM PRECISION ERRORS OF DENSITY INDEX MEASUREMENTS AT THE PROXIMAL TIBIA USING THE BINDEX® SCANNER.....	123
COST-EFFECTIVENESS OF OSTEOPOROTIC FRACTURE RISK ASSESSMENT IN PEOPLE WITH INTELLECTUAL DISABILITIES.....	124
FRACTURE RISK IS SIGNIFICANTLY ASSOCIATED WITH CARDIOVASCULAR RISK IN PATIENTS WHO QUALIFY FOR ROMOSOZUMAB TREATMENT	125
BIOELECTRICAL IMPEDANCE ANALYSIS AS A NOVEL, ACCESSIBLE METHOD TO DIAGNOSE OSTEOPOROSIS	127
PRIOR ANTIRESORPTIVE TREATMENT REDUCES LUMBAR SPINE BMD RESPONSE TO ROMOSOZUMAB IN CAUCASIAN POSTMENOPAUSAL WOMEN WITH SEVERE OSTEOPOROSIS.....	128
IS POOR GLYCEMIC CONTROL A RISK FACTOR FOR THE DEVELOPMENT OF OSTEOPOROSIS IN TYPE 2 DIABETES MELLITUS?: A CROSS-SECTIONAL STUDY .	129
PRE-CLINICAL STUDY EVIDENCING AN OPPORTUNISTIC SCREENING APPROACH IN SECONDARY CARE TO IMPROVE PRIMARY CARE REFERRAL FOR PATIENTS AT HEIGHTENED FRACTURE RISK	130
PRIMARY CARE BASED OPTIMISATION OF ANTI-OSTEOPOROSIS MEDICATION ADHERENCE: GRASP OSTEOPOROSIS	131
UK RATES AND DETERMINANTS OF ROMOSOZUMAB PRESCRIPTIONS IN 2022: A NEED FOR GREATER ACTION	133

USING STANDARD COMPUTERISED TOMOGRAPHY (CT) SCANS FOR OPPORTUNISTIC IDENTIFICATION OF OSTEOPOROSIS AND VERTEBRAL FRACTURES: VIEWS OF OLDER PATIENTS.....	134
MULTI-SITE RADIOLOGICAL REPORTING OF VERTEBRAL FRACTURES IN CT IMAGING	135
PREDICTING HIGHER PERFORMING FRACTURE LIAISON SERVICES: A CLUSTER ANALYSIS OF THE FLSDB AUDIT OF ENGLAND AND WALES.....	136
VXP: A NOVEL VERTEBRAL FRAGILITY FRACTURE RADIOLOGY REPORTING CODE FOR IMPROVING OSTEOPOROSIS SCREENING AND SECONDARY PREVENTION IN ROUTINE CT SCANS	137
MATERNAL FAMILY HISTORY OF OSTEOPOROSIS IS COMMON IN WOMEN WITH PREGNANCY ASSOCIATED OSTEOPOROSIS AS COMPARED WITH CONTROLS.....	138
IMMINENT FRACTURE INCIDENCE AMONG INDEX FRACTURE PATIENTS WITH MULTIPLE MYELOMA: A PARALLEL COHORT STUDY OF THE UK CPRD GOLD	139
PREGNANCY ASSOCIATED OSTEOPOROSIS IS ASSOCIATED WITH SUBSTANTIALLY REDUCED QUALITY OF LIFE IN THE SHORT AND LONG TERM.....	140
SUBSEQUENT HIP FRACTURES IN PATIENTS IDENTIFIED BY A FRACTURE LIAISON SERVICE (FLS) IN ENGLAND AND WALES – LINKAGE OF THE NATIONAL FLS AND HIP FRACTURE DATABASES	141
PATIENT RECOVERY FOLLOWING HIP FRACTURE IS ASSOCIATED WITH MULTIPLE MODIFIABLE COMPONENTS OF HOSPITAL SERVICE DELIVERY IN ENGLAND AND WALES: THE REDUCE RECORD-LINKAGE COHORT STUDY	142

ROS 2023

Invited Speaker Abstracts

UNDERSTANDING BMD AND DXA MEASUREMENTS

Nicola Peel

Metabolic Bone Centre, Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield, UK

Bone mineral density (BMD) measurement using dual-energy x-ray absorptiometry (DXA) is a key component of fracture risk assessment. DXA uses very low x-ray doses to assess BMD at clinically important skeletal sites, namely spine and hip. Indications for DXA assessment and interpretation are included in UK guidelines.

BMD is strongly associated with fracture risk and measurements are used in the WHO definition of osteoporosis. However, many other factors such as age and prior fracture history are independently associated with the risk of fracture, providing additional information about a person's risk and BMD measurements should always be interpreted in the context of a comprehensive fracture risk assessment. Knowledge of BMD can inform decisions about initiating treatment, the choice of treatment and its duration but BMD measurement has a limited role in monitoring response to treatment. The magnitude of change in comparison to the 'noise' of the measurement means that an interval of at least 2 years is generally required to detect a significant change.

Confident and effective use of BMD measurements requires the acquisition of high quality scans, an understanding of the DXA technique and its limitations, recognition of factors that can affect reliability of the measurement and a systematic approach to interpretation. Critically, the result must be contextualised and communicated clearly to enable the patient to make an informed decision about their management and to ensure that every BMD measurement adds value.

ANABOLIC THERAPY FOR OSTEOPOROSIS, WHEN, WHO AND WHAT WITH?

Stuart Ralston¹, Rosemary Holick²

¹Centre for Genomic and Experimental Medicine, University of Edinburgh, Edinburgh, UK, ²Institute of Applied Health Sciences, University of Aberdeen, Aberdeen, UK

Anabolic therapies are now in widespread use for the treatment of osteoporosis since in many patients, they offer greater efficacy than standard therapy with oral bisphosphonates. Here we will review the considerations for when to advise anabolic therapy, who is most likely to benefit from such treatment and what anabolic treatment to choose. Teriparatide (TPTD) was the first anabolic to be used clinically and it remains a valuable option for postmenopausal women with severe spinal osteoporosis and vertebral fractures where it has been shown to be superior to oral bisphosphonates. Although it also has positive effects on sites rich in cortical bone, and reduces the incidence of non-vertebral fractures compared with placebo, the preventative effects on non-vertebral fractures do not differ from those of oral bisphosphonates. Romosozumab is a relatively new anabolic with potent anabolic effects at both trabecular and cortical bone due to inhibitory effects on bone resorption and stimulatory effects on bone formation. It is an excellent choice for women with severe spinal osteoporosis with vertebral fractures who are also at high risk of sustaining non-vertebral fractures. It has been found to be superior to oral alendronate in women with these characteristics. Both treatments need to be followed up by antiresorptive therapy to maintain the increase in BMD long-term and this is usually achieved by oral or intravenous bisphosphonates. These treatments are not suitable for everyone however; TPTD is contraindicated in those previously treated with radiotherapy which rules out many patients with breast cancer. Romosozumab is contraindicated in those with pre-existing cardiovascular and cerebrovascular disease which excludes some patients from treatment. In clinical practice, some patients who are suitable for therapy decline these treatments because of needle phobia or, in the case of romosozumab, because of concerns about cardiovascular adverse effects. In most people with severe osteoporosis however, the potential benefit of these treatments outweighs the potential risks and more widespread use offers the prospect of improving outcomes for this group of patients.

BONE HEALTH ESSENTIALS: VERTEBRAL FRACTURES - WHO TO X-RAY

Emma M Clark^{1,2}

¹Translational Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK, ²Rheumatology Department, North Bristol NHS Trust, Bristol, UK

This talk will cover the importance of vertebral fractures for improving prediction of future fracture risk, and for targeting interventions to improve health-related quality of life. Clinical features in the history and physical examination which indicate someone at a high risk of having a vertebral fracture will be highlighted. Indications for vertebral fracture assessment (VFA) as part of DXA will also be discussed.

OSTEOPOROSIS PATIENT EDUCATION

Mette Friberg Hitz

Department of Endocrinology, Zealand University Hospital, Koege, Denmark

This talk will cover patient education for patients with osteoporosis. Results from a the systematic review on patient education will be presented as well as data from an evaluation of a mobile health technology My Bones, developed for patients with osteoporosis in Denmark.

BONE HEALTH IN INFLAMMATORY CONDITIONS

Elaine Dennison

MRC Lifecourse Epidemiology Centre, Southampton University, Southampton, UK

There are several inflammatory joint conditions, but rheumatoid arthritis is the most common, affecting 1% of the UK population, with women affected twice as often as men. Ethnic differences occur regarding prevalence of the condition, but also very importantly for likelihood of receiving some therapies. Inflammatory arthritis is commonly associated with poorer bone health and fragility fracture, not only through a direct association between inflammation and bone but also through possible confounding effects of medication (particularly corticosteroids) and reduced levels of physical activity. This presentation will review recent epidemiological studies considering the association between rheumatoid arthritis and osteoporosis and fracture, before discussing possible treatment strategies. We will also consider why the bone health of people with inflammatory arthritis may not be considered or assessed, and how we as clinicians can ensure that we educate our patients and colleagues to always consider bone health as part of regular ongoing review.

INTERNATIONAL PERSPECTIVES ON NUTRITION AND BONE HEALTH

Kate Ward

MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, UK

By 2050 there will be 2 billion people aged over 65 years in comparison to 600 million today and the steepest increase will be in low- and middle-income countries (LMIC). As LMICs undergo rapid epidemiological transition, which includes changes to lifestyle such as urbanisation, poorer diet quality, 'Western' dietary patterns and food availability. These changing lifestyles lead to increases in the occurrence of chronic non-communicable diseases (NCDs), including osteoporosis and fragility fractures. There are many environmental factors that contribute to bone health throughout life. Those that can be modified through changes in nutrition and provide sustainable opportunities for intervention at the individual and population level. These may be alterations to: micronutrient status or intake, diet quality/ patterns, microbiome for improvements in inflammation and nutrient absorption or changes in body weight. Behavioural interventions at individual or community level should also be considered. All provide strategies to intervene for better bone health and prevention of osteoporosis, yet evidence is limited across diverse contexts.

As well as having potential, positive impacts on bone health, there are opportunities through changes in nutrition to also impact the wider musculoskeletal system of muscle (sarcopenia) and joint (osteoarthritis). Optimising functional ability is essential for maintaining mobility and the ability to undertake the physical tasks of daily living for prevention of falls, fractures and to reduce morbidity and mortality. In summary, the session will provide an overview of current evidence for the importance of nutrition for bone health across populations and contexts, and where opportunities may lie for improvements in the health of older people.

BONE HEALTH ESSENTIALS: MANAGEMENT IN DIVERSE GROUPS – OVERVIEW OF TREATMENT OPTIONS

Matthew Grove

Rheumatology, Northumbria Healthcare NHS Foundation Trust, North Shields, UK

This talk will cover the range of treatment options available for osteoporosis in 2023, from simple calcium and vitamin D through to the latest biologic therapies. Dr Grove is chair of the North East and North Cumbria Integrated Care Board Medicines Guidelines Group, so will specifically consider how inequity of access to these medicines can be improved by better and more specific guidelines to their use.

INVESTIGATING FOR CAUSES OF SECONDARY OSTEOPOROSIS

Jennie Walsh

Mellanby Centre, University of Sheffield, Sheffield, UK

Up to 30% of postmenopausal women, 50% of premenopausal women and 80% of men with osteoporosis will have an underlying cause. It is important to identify underlying causes for several reasons. Fracture risk may be underestimated by BMD when there is an underlying pathology that has specific effects on bone. The underlying problem may require treatment, and treating it will treat the osteoporosis. Secondary osteoporosis may not respond to standard treatment until the underlying problem has been removed. Secondary osteoporosis should be suspected when there is unusual fracture history, when BMD is low for age (Z-score <-2.0), when there is low BMD with no identified risk factors, if there are multiple vertebral fractures, or an unexpected decrease in BMD. The commonest undiagnosed causes of osteoporosis are hypercalciuria, malabsorption, primary hyperparathyroidism and vitamin D deficiency. Less common causes include Cushing's syndrome, hyperthyroidism, myeloma and mastocytosis. Measurement of serum calcium, PTH, 24h urine calcium and TSH will identify most underlying causes in postmenopausal women. Incorporating investigations into a one-stop shop pathway is an effective way to identify patients with underlying causes of osteoporosis.

'ONCE FOR SCOTLAND' APPROACH TO FRACTURE CARE: SCOTTISH HIP FRACTURE AUDIT, THE NEW BONE HEALTH POST HIP FRACTURE PATHWAY AND PROPOSED FLS AUDIT FOR SCOTLAND

Alison Black

Rheumatology Department, NHS Grampian, Aberdeen, UK

Scottish Government coined the term 'Once for Scotland' to describe a whole system approach to provide equitable services throughout Scotland. A 'Once for Scotland' approach seeks to provide national answers to pressing problems by organisational change and sharing of good Practice. In the NHS this is exemplified by the work of the Scottish Medicines Consortium (SMC) and the Scottish Intercollegiate Guideline Network (SIGN). In 1993 the Scottish Hip Fracture Audit (SHFA) was launched and this now covers all mainland Health Boards and the Western isles of Scotland. This long standing audit has enhanced standards of care for post hip fracture patients. Using a 'Once for Scotland' approach collaborative working between the Bone Interest Group of Scotland and the SHFA has led to the development of a new post hip fracture bone health pathway utilising Zoledronate in the inpatient setting. This pathway will form part of a new SHFA standard. The first organised Fracture liaison service (FLS) was based in Glasgow in 1998 and Scottish government has recently agreed funding for a Scottish FLS audit scoping exercise which is currently ongoing. It is hoped that funding for a comprehensive audit similar to that in the rest of the UK can be achieved. Scotland covers a large geographical area with a large central belt conurbation which houses 70% of the Scottish Population. Taking a whole country approach encourages equitable services particularly with the unique population demographics in Scotland.

BONE HEALTH IN THE GENDER DIVERSE POPULATION

Eleni Kariki

Faculty of Medicine and Health Sciences, Keele University, Keele, England, UK

The gender diverse population becomes larger and more diverse, with more people coming out at younger age, more people from different ethnographic and socioeconomical backgrounds managing to find the way to available healthcare services, more younger people commencing their transition journey, more and different transition options being developed and being chosen at different life stages. There are two key facts to acknowledge, understand and remember about the gender diverse population in relation to the healthcare we provide:

1. They remain underserved despite the increasing knowledge and plethora of learning outlets available to healthcare providers and policy makers, and despite gender diverse healthcare having become a matter that draws attention, generates controversies, and attracts public and central popularity. Managers and other staff may declare NHS' solidarity by using their pronouns and introducing trans and diversity rhetoric to policies, while at the same time gender diverse people receive inadequate, untimely, and uninformed NHS healthcare services.
2. They suffer a long painful suspicion, criticism, and doubt through their contact with healthcare providers and often they would rather limit their interactions with healthcare professionals.

Osteoporosis and bone diseases affect people of all genders, sexes, and races. There are data suggesting that the incidence of osteoporosis increases, and we know that costs related to osteoporosis also increase. Bone health does not yet attract interest by healthcare providers and policy makers, despite the proven tremendous impact on people, their quality of life and life expectancy, and on healthcare costs. With disperse and limited explicit information available specific for the gender diverse population, with a clinically restrictive definition of osteoporosis and with politics interfering with the essence of healthcare services that is equity, equality, quality and safety for everyone, it is up to each one of us to explore and address the multiple factors-gender affirming treatment, treatments for other diseases, individual lifestyle, health policies, guidelines, social issues-that determine best bone health practices which can better serve gender diverse people, and to challenge what is harmful to the gender diverse population and can compromise the bone health care they receive.

BONE HEALTH ESSENTIALS: INVESTIGATIONS - MAKING THE BEST USE OF BONE TURNOVER MARKERS

Richard Eastell

Oncology and Metabolism, University of Sheffield, Sheffield, UK

Bone turnover markers can be measured in blood or urine, and they provide information about the activity of bone cells and, as a result, are very useful in investigating the patient with osteoporosis. Bone resorption markers reflect the work of the osteoclast and the ones that are commonly used in practice include the C-terminal telopeptide of type I collagen (CTX), which is usually measured in plasma or serum, and the N-terminal telopeptide of type I collagen (NTX) which is usually measured in urine and expressed as a ratio to creatinine. Bone formation markers reflect the work of the osteoblast, and the ones commonly used in practice include serum procollagen I N-propeptide (PINP), osteocalcin and bone-specific alkaline phosphatase. These markers are often measured using automated immunoassay analysers or ELISA kits and are widely available. It is important to allow for various sources of variation, such as the circadian rhythm and the effect of age. Thus, levels of CTX are highest first thing in the morning in the fasting state (when they should be measured), and levels of all bone turnover markers are higher in older women than in men or younger women. High levels of bone turnover markers in older women are associated with higher fracture risk and a greater bone loss rate. They may raise a suspicion of an underlying cause of osteoporosis, such as an overactive thyroid. The best use of bone turnover markers, and one that is supported by international organisations such as the IOF and the ECTS, is their use for monitoring response to oral bisphosphonate therapy to identify good adherence to treatment. We recommend measurement before starting treatment and again three to six months later. All the bone turnover markers decrease in response to such treatment, and a decrease beyond the least significant change indicates good compliance with therapy. The inequalities lie in the provision of services for the measurement of these markers within the UK.

THERAPEUTIC DILEMMAS: GREY AREAS - ROMOSUZUMAB AND CARDIOVASCULAR RISK

Sarah Hardcastle

Rheumatology, Royal National Hospital for Rheumatic Diseases, Bath, UK

Romosozumab, a humanised monoclonal anti-sclerostin antibody, has recently been approved for the treatment of severe osteoporosis in postmenopausal women in the UK. It is the first new osteoporosis medication to become available in over 10 years, and has a unique dual anabolic and antiresorptive mechanism of action. Clinical trials have shown that romosozumab treatment significantly reduces the incidence of fractures (in particular vertebral fractures) and produces substantial gains in bone mineral density. However the ARCH study reported an imbalance in the number of cardiovascular events (including both ischaemic cardiac events and cerebrovascular events) in the treatment group who received romosozumab compared with the control (alendronate) group, raising concerns about cardiovascular safety. For this reason, romosozumab is currently contraindicated in patients with a previous myocardial infarction or stroke, and it has been recommended that clinicians should undertake an individualised cardiovascular risk assessment prior to commencing romosozumab. This presentation will review the current evidence supporting a link between romosozumab and increased cardiovascular risk, as well as exploring practical approaches to both assessing risk and discussing it with patients in the osteoporosis clinic.

YOUNG PEOPLE- AROMATASE INHIBITORS/EATING DISORDERS

Jennie Walsh

Mellanby Centre, University of Sheffield, Sheffield, UK

In general, fracture risk is low in young people. Even though low BMD increases the relative risk of fracture, the absolute risk is still low. Generally, the recommend approach is to address risk factors as much as possible, monitor BMD and reserve pharmacological treatment for people with fractures or rapidly decreasing BMD.

Breast cancer does affect premenopausal women, and adjuvant treatment may include aromatase inhibitors. The rapid decrease in oestrogen die aromatase inhibitor treatment can cause significant bone loss in this group. It is important that their fracture risk is assessed and other modifiable risk factors are addressed, The 2008 UK consensus Guidelines recommend that women who are made amenorrhoeic by breast cancer treatment and are taking an aromatase inhibitor should have bone protection with a bisphosphonate if their T-score is less than -1.0.

Anorexia nervosa is associated with increased fracture risk. HR-pQCT FEA studies have demonstrated cortical thinning and reduced cortical and trabecular bone density leading to reduced bone strength. Bone loss in anorexia is multifactorial, due to reduced active and passive loading, nutritional deficiencies, and complex endocrine effects. The evidence for pharmacological treatment is quite limited due to small numbers in studies. Risedronate has been shown to improve BMD in women over age 18, and transdermal oestrogen restores BMD to similar levels to controls in younger women. The most effective treatment for bone loss in anorexia is treatment of the underlying eating disorder, weight gain and restoration of spontaneous menses.

SPEAKING OUR LANGUAGE - PATIENT ENGAGEMENT

Zoe Paskins, Joanne Protheroe

School of Medicine, Keele University, Keele, UK

In this session, Professor Jo Protheroe, Professor of General Practice and Dr Zoe Paskins, Reader and Honorary Consultant Rheumatologist, both from Keele University, will be joined by video testimonies from people with lived experience talking about the impact of conversations with healthcare professionals on their health and wellbeing, the importance of good communication, and their preferences for how to talk to, and make decisions with, health professionals. Jo Protheroe will talk about health literacy: what it is, why it is important and how we can all take universal precautions in our practice to make communication accessible for people with all ranges of health literacy. Jo will also explain what shared decision making is, and how health literacy plays a crucial role in promoting effective shared decisions between health care professionals and patients, with practical tips for incorporating shared decision-making practices into everyday consultations. Zoe Paskins will end the session talking about the power of mis-communication. She will explore the common myths, stigma and stereotypes associated with osteoporosis, and the impact these myths can have on patient behaviour. She will talk about how these myths can be propagated in our post-truth, anti-science era, and how healthcare professionals have an important role in rejecting or inadvertently promoting these stereotypes in our own communications.

THE CLINICAL RELEVANCE OF MICRONUTRIENTS ON MUSCLE AND BONE

Ailsa Welch

Norwich Medical School, University of East Anglia, Norwich, Norfolk, UK

The presentation will focus on the importance of diet quality, through the micronutrient vitamins and minerals, on bone and skeletal muscle health. Bone and muscle tissues are interrelated, and it is well established that sarcopenia (the loss of skeletal muscle mass and function) is related to risk of fractures and onset of osteoporosis. Nutrition interacts with both these body compartments by impacting on the capacity of the body to maintain their structure, and on the mechanisms of aging which lead to loss of skeletal muscle mass and function, and bone density with age. Protein is important for maintaining the structure of both muscle and bone and calcium is required for mineralization of bone and muscle contraction. Bone and muscle structure and their metabolism are influenced by the mechanisms of aging which include chronic low grade circulating inflammation e.g. C-reactive protein and oxidative stress. Certain dietary micronutrients with 'antioxidant' capacity moderate inflammation and oxidative stress e.g. vitamins C and E, the carotenoids, magnesium, selenium and zinc. Recent research findings for micronutrients and musculoskeletal health such as the vitamins C, E the carotenoids and magnesium will be presented, as will data on the micronutrient dense dietary pattern the Mediterranean Diet (1,2,3). Within our UK population great disparities in the quality and the micronutrient density of the diet exist resulting in lower micronutrient status, micronutrient deficiency and undernutrition. The population groups at most risk are people of older age, those with low income or living in areas of disadvantage, residential or secondary care. Individuals following a vegan eating pattern may also be at risk of micronutrient deficiency. Food sources of the micronutrients and the relevance of the research presented in relation to the UK eating guidelines will be discussed. References 1) Welch A, Hayhoe RPG, Nutritional Approaches for Sarcopenia: Sarcopenia 2021. 2) Lewis L et Al, Welch A, Lower dietary and circulating vitamin C.... : Nutrients 2020. 3) Welch A et Al, Dietary magnesium may be protective.. : Nutrients. 2017.

QUALITY CARE FOR EVERYBODY - HIP FRACTURE: EQUITY IN CARE

Celia Gregson

Musculoskeletal Research Unit, University of Bristol, Bristol, UK

Equality in hip fracture care delivery means that all patients receive the same, equal, treatment, irrespective of need. Equity in hip fracture care means that provision varies, according to need, so that all patients get the right level of care to ensure outcomes are equal. Justice in care removes barriers to access treatment, so that ideal 'quality care' is available to all. This talk will address how the reality of current hip fracture care provision stacks up against the principles of equity and justice, and what we can do to address inequity. I will review data on inequalities in hip fracture incidence, on hip fracture care delivery, and on patient outcomes. I will consider whether inequalities in care delivery are justified by patient need, i.e., by patient case-mix, and hence the equity of care delivery, and review how current hip fracture care delivery, taking account of patient need, is associated with patient outcomes. I will also review the relationship between deprivation and patient outcomes in the context of hip fracture, and consider associated health costs. I will finish by reviewing potential approaches and solutions to promote delivery of high-quality equitable hip fracture care.

“QUALITY CARE FOR EVERYBODY – FRACTURE LIAISON SERVICE: ALL WALES APPROACH”

Inderpal Singh

Geriatric Medicine, Aneurin Bevan University Health Board, Caerphilly, UK

Background: Fracture Liaison Services (FLS) systematically identify and investigate causes for osteoporosis and treat eligible patients aged 50 and older who have suffered a fragility fracture. FLS is the cost-effective way to reduce the risk by 30% for any re-fractures and a 40% reduction for major re-fractures.

Objective: To overcome the enormous variability in fragility fracture care, Welsh Government (WG) has set out a top-down mandate to deliver the Falls and Fragility Fracture Audit Programme recommendations. A National Clinical Lead was appointed by WG in 2020 to provide stronger clinical leadership.

Results: Hip fracture incidence is rising since covid-19. Only three FLSs in Wales are registered with the FLSDB. In the year 2020, the anticipated burden of all fragility fractures was 28,646. In total 2,578 patients (9%) were identified in Wales, and 1,469 (57%) started on treatment. Only 338 (23%) were recorded to be continuing this at a one-year follow-up. Based on the 80/50/80 model, missed opportunities to prevent re-fractures were 8,828.

Discussion: A wider integration and partnership work has been introduced to ensure high-quality fracture care over the past 2 years across Wales. These include undertaking a national review of services, working closely with the Royal Osteoporosis Society, utilizing their support to help shape policy by using FLS cost-benefit analysis; engaging with Welsh Health Boards to assess their business case approaches and provide support accordingly; holding the inaugural FLS National Conference. FLS Development and Quality Assurance Board (Wales), which is accountable to the Minister for Health and Social Services has been established for delivering a national standardised equitable access to FLS. Welsh Medical Directors and Nursing Leaders have agreed to ensure the effective development of Clinical Nurse Specialists as key clinicians delivering FLS.

The Minister has issued a Written Statement setting out clear expectations that everyone in Wales must have access to an FLS and Health Boards must take ownership of delivering these services. The Minister's ambition of full national coverage and improved services should be achieved by September 2024.

Conclusion: Our mission to implement FLS across Wales is consistent with the WG policy of 'A Healthier Wales' to develop an integrated community care system and support.

MANAGING eGFR AND BONE

Richard Keen

Centre for Metabolic Bone Disease, Royal National Orthopaedic Hospital, Stanmore, UK

Osteoporosis and chronic kidney disease (CKD) are both common conditions which increase in prevalence with ageing, and will often co-exist. NHANES III has shown that more than 60% of women with a diagnosis of osteoporosis had CKD stage 3 (eGFR 30-59 ml/min) and 23% had CKD stage 4 (eGFR 15-29 ml/min). CKD is also associated with disturbances in bone and mineral metabolism. Fracture risk rises in parallel with decreasing renal function. Clinical risk factors for osteoporosis in CKD patients include traditional risk factors but also non-traditional ones such as time spent on dialysis, metabolic acidosis and low grade inflammation. CKD patients are also at increased risk for falls, and it is important to examine for modifiable falls-related risk factors and to consider exercise interventions to improve muscle strength and balance.

In patients with CKD, DXA can be used to diagnose osteoporosis and assess fracture risk. Vertebral fractures are common in patients with CKD, and imaging of the spine is also recommended either with spinal radiographs or Vertebral Fracture Assessment (VFA) with DXA. Non-kidney retained biochemical bone turnover markers such as bone specific alkaline phosphatase may be useful for fracture-risk prediction but further research and confirmation is needed.

Treatment of osteoporosis in patients with CKD stages 1-3 (eGFR above 30 ml/min) is generally the same as in those without CKD. Bisphosphonates are not recommended in those with reduced renal function (oral < 30 ml/min; IV < 35 ml/min), although post-hoc analysis of pivotal clinical trials has demonstrated that in patients with CKD 4 there is similar efficacy with regards to increasing bone mass and reducing fracture rates. Denosumab is not associated with kidney function decline, although the risk of post-dose hypocalcaemia is increased in CKD patients. Many patients with CKD have low bone turnover, and anabolic drugs could be considered promising but further research and clinical experience is needed with these newer drugs.

MANAGEMENT OF SYMPTOMATIC VERTEBRAL FRACTURES – NEW CONSENSUS GUIDANCE PRACTICE POINTS

Terence O'Neill

Centre for Epidemiology Versus Arthritis, University of Manchester, Manchester, UK

Vertebral fractures are the most frequent fracture in people with osteoporosis, with one in eight men and women over the age of 50 years affected. Their clinical impact is significant. Vertebral fractures cause back pain, height loss, hyper kyphosis and functional impairment. They are linked also with a number of other symptoms including low mood, anxiety, loss of self-confidence, fear of falling and depression. A range of pharmacological and non-pharmacological therapies are used in management of symptoms of patients with vertebral fractures, however the evidence base underpinning their effectiveness is limited and there is a paucity of guidance to help inform practice. To address the gap the Royal Osteoporosis Society have recently produced a guidance document for the management of symptomatic vertebral fragility fractures (www.theros.org.uk). The guidance was developed following a scoping review and consultation process which included patients and their carers, relevant professional bodies and expert clinicians in the field and was informed by published evidence and consensus. The guidance is intended for use by health care professionals who engage directly or indirectly with people with osteoporosis and vertebral fracture including general practitioners and secondary care health care professionals, including physicians, radiologists and orthopaedic surgeons, and also clinical pharmacists, nurses and allied health care professionals. The guidance outlines how health care professionals can best support patients who present in the community or in hospital with symptomatic vertebral fragility fractures and includes information about the assessment and management of symptoms of patients with a fracture, support for self-management and signposting of patients to other published guidance and resources. It includes also a series of key practice points around the identification of vertebral fracture, assessment of patients, management of pain, the role of exercise and physical activity, management of psychological symptoms, falls assessment and also self-management. The guidance and key practice points should help guide and support clinicians in the management of symptomatic vertebral fracture and contribute to improved outcomes for patients.

BONE HEALTH ESSENTIALS: MANAGEMENT IN DIVERSE GROUPS - MANAGEMENT IN THE FRAIL OLDER ADULT AND COGNITIVELY IMPAIRED

Madhavi Vindlachervu

Orthogeriatrics, Cambridge University Hospitals NHD Foundation Trust, Cambridge, UK

Due to global population ageing, there are increasing numbers of older adults living with chronic musculoskeletal conditions, of which osteoporosis is the most common. Fragility fractures result from low-trauma injuries, most commonly a fall from standing height or lower. Compared with younger adults, older adults with a fragility fracture have a much greater risk of worse outcomes, including prolonged length of hospital stay, premature mortality, and high use of health and social care resources. The significant risk of adverse outcomes is often a consequence of medical co-morbidities and the geriatric condition of frailty. Frailty is complex and can be defined as the progressive age-related decline in physiological systems that results in decreased reserves of intrinsic capacity, which leads to extreme vulnerability to stressors and increases the risk of adverse health outcomes. Frailty is associated with a decline of musculoskeletal, sensory, and neurological systems, which in turn increases falls risk and the likelihood of further fragility fractures. Clinically, frailty can predict response to treatment and the likelihood of adverse clinical outcomes, and thus can be used to quantify any likely harms or benefits from proposed medical or surgical interventions. Treating osteoporosis in frail older patients requires a multi-faceted approach focusing upon bone health and falls prevention strategies including education, medication reviews, nutrition, exercise, strength and balance training, smoking cessation, avoidance of excess alcohol and calcium and vitamin D supplementation of the diet. Decisions to treat with pharmacological therapies are based on fracture risk algorithms using clinical risk factors, with or without bone mineral density. However, in older patients frailty must be considered as it greatly impacts upon an older patient's ability to respond to stressors, such as fractures and hospital admission. Osteoporosis treatment in frail older patients is highly effective, results in reductions in fracture risk and enables the maintenance of functional independence. This cohort benefit greatly from a holistic and person-centred approach to management to ensure that frailty, complex medical comorbidity and all the things that are important to that individual are recognised and considered.

ROS 2023

Orals

Barbara Hauser^{1,2}, Polle Ravji¹, Morven McRorie², Kathryn Berg², Stuart H Ralston^{1,2}

¹Rheumatic Disease Unit, NHS Lothian, Edinburgh, UK

²Rheumatology and Bone Disease Unit, Centre for Genomic and Experimental Medicine, University of Edinburgh, Edinburgh, UK

FRACTURE RISK IS SIGNIFICANTLY ASSOCIATED WITH CARDIOVASCULAR RISK IN PATIENTS WHO QUALIFY FOR ROMOSUZUMAB TREATMENT

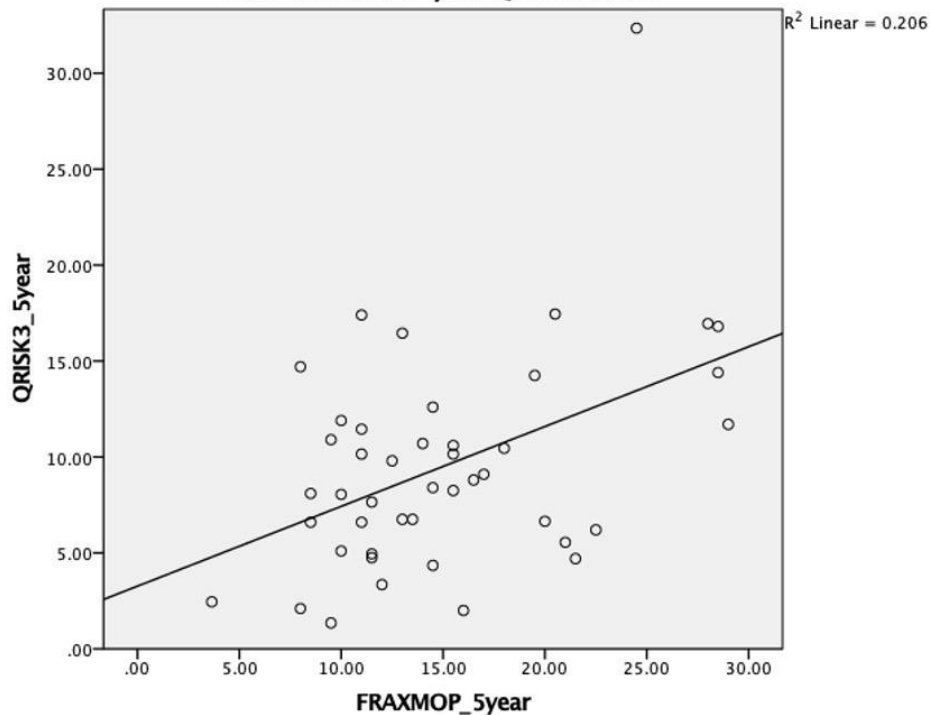
Introduction: Romosozumab is a newly licensed osteoporosis (OP) treatment for patients at very high fracture risk. Cardiovascular safety concerns were raised from a post-hoc analysis of a pivotal study (ARCH)¹ which detected a numerical increased rate of major cardiovascular (CV) events in the Romosozumab group when compared to the Alendronate group².

Objective: Our aim was to analyse baseline cardiovascular risk of patients who were started on Romosozumab and to analyse whether increased cardiovascular risk correlates with elevated fracture risk.

Methods: Retrospective single-centre analysis of patients who have qualified for Romosozumab according to SIGN guidance between February 2021 and November 2022. Major osteoporotic (MOP) and hip fracture risk was calculated with the BMD adjusted FRAX® tool. Cardiovascular risk was assessed with QRISK3®.

Results: Out of 56 patients who have been offered Romosozumab, all patients were postmenopausal women with an average age of 73.1 ± 9.7 years and BMI of 24.4 ± 7.1 kg/m². The baseline 5-year fracture risk was $16.1\% \pm 6.8\%$ for MOP fractures and $8.9 \pm 7.4\%$ for hip fractures. The baseline 5-year cardiovascular risk was $9.8 \pm 5.9\%$. The most common cardiovascular risk factors were hypertension (25%), history of smoking (21.4%), current smoking (14.3%), RA or SLE (10%) and Cholesterol/HDL ratio >4.0 (9.1%). The mean baseline systolic blood pressure was 151.9 ± 18.5 mmHg. Pearson correlation analysis showed a significant positive relationship between MOP fracture risk and cardiovascular risk ($r = 0.45$; $p = 0.002$) as shown in Figure 1.

Figure1 Scatter plot showing relationship between 5-year FRAX MOP risk and 5-year QRISK3 score



Conclusion: Patients who were offered romosozumab had a high fracture risk but also had a high cardiovascular risk. Given the substantial benefits of romosozumab on fracture risk reduction (approximately 40%) and relatively small increase in CV risk (approximately 1%) we do not think that an arbitrary cardiovascular cut off should be used to exclude patients from treatment. Prescribing physicians should however, assess and treat modifiable CV risk factors such as hypertension, smoking and hypercholesterolaemia.

Conflicting Interests: Prof. Stuart Ralston reports research grants to his institution from Kyowa Kirin, AstraZeneca; donations of investigational medicinal products from Eli Lilly and Novartis to his institution for clinical trials; financial support to his institution for educational events from Pfizer, Abbvie, Kyowa Kirin, Alexion, Amgen, Cellgene, Bristol Myers Squibb, Janssen-Cilag, Novartis, Eli Lilly, Thornton & Ross, AstraZeneca, Sanofi Genzyme, Sandoz, and Roche; and financial support to his institution for consultancy work from UCB, all outside the submitted work. Dr. Hauser reports research grants to her institution from Novartis and consultancy fees from UCB outside the submitted work.

Kathryn Berg, Elizabeth Orhadje, Karen Whitehead, Barbara Hauser, Stuart Ralston

¹Centre for Genomics and Experimental Medicine, University of Edinburgh, UK

PREGNANCY ASSOCIATED OSTEOPOROSIS IS ASSOCIATED WITH SUBSTANTIALLY REDUCED QUALITY OF LIFE IN THE SHORT AND LONG TERM

Background: Pregnancy Associated Osteoporosis (PAO) is a rare disorder typically presenting with multiple vertebral fractures during pregnancy or in the puerperium. The effects of PAO on quality of life (QoL) have been little studied.

Objective: To evaluate the effects of PAO on quality of life.

Methods: Individuals with a self-reported history of PAO were recruited through a web-based survey which included five questions from the Short Form 36 Health Survey Questionnaire (SF-36). Each participant was asked to identify someone who had a pregnancy around the same time but who had not experienced PAO to act as a control. Participants were asked to complete the questions in retrospect at the time of their pregnancy and at the current time.

Results: The average (SD) age of women with PAO at the time of recruitment was 40.2 (9.8) years and of controls 42.0 (11.3) years ($p = 0.15$). The time between the affected pregnancy and survey response in the PAO cases was 7.4 (9.8) years compared with 10.3 (11.7) years in the controls ($p = 0.02$). The QoL results are summarised in the table. Women with PAO had significantly lower scores in all domains at the time of the original presentation as compared with controls. Mean QoL increased with time in the PAO group ($p = <0.001$) and remained stable in controls ($p = 0.389$). Despite this improvement, QoL remained significantly lower in PAO cases versus controls at the time of survey response (mean 7.4 years later).

Discussion: Women with PAO have substantially reduced quality of life compared with controls at the time of diagnosis. While this improves with time, possibly as the result of fracture healing, those affected by PAO continue to have reduced quality of life in the long term.

	<i>PAO Cases (N = 152)</i>	<i>Controls (N = 124)</i>	<i>p-value</i>
Quality of life at the time of PAO diagnosis or pregnancy in controls			
Felt Calm and Peaceful	21.6 ± 24.8	66.5 ± 21.5	<0.0001
Had a lot of Energy	18.2 ± 20.7	56.6 ± 22.1	<0.0001
Felt Depressed	41.5 ± 31.9	87.7 ± 18.8	<0.0001
Health Interfered with Social Activities	20.6 ± 27.8	84.6 ± 24.1	<0.0001
Mean QoL Score	25.5 ± 28.2	74.0 ± 25.1	<0.0001
Quality of life at the time of completing the survey			
Felt Calm and Peaceful	55.2 ± 24.3	66.2 ± 18.6	0.0002
Had a lot of Energy	48.1 ± 26.6	61.0 ± 17.8	<0.0001
Felt Depressed	72.6 ± 24.3	83.9 ± 17.8	<0.0001
Health Interfered with Social Activities	63.6 ± 34.8	89.8 ± 17.5	<0.0001
Mean QOL Score	59.8 ± 29.2	75.2 ± 21.4	<0.0001

Table : Adjusted quality of life scores for cases and controls, showing mean and standard deviation.

Lower values indicate poorer quality of life.

Final Oral Number: O03

Ashley Hawarden^{1,3}, Laura Barlow², Mohammed Okour², Giles Fitch², Angela McGowan², Caitlyn Dowson^{1,3}, Zoe Paskins^{1,3}

¹School of Medicine, Keele University, Staffordshire, UK

²Respiratory Department, University Hospitals of North Midlands NHS Trust, Staffordshire, UK

³Haywood Academic Rheumatology Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

AN UNUSUAL CASE OF EXTREMELY ELEVATED ALKALINE PHOSPHATASE IN AN ADULT

Background: Benign transient hyperphosphatasia (BTH) is a condition that typically affects children. It is characterised by a marked increase in serum alkaline phosphatase (ALP) activity, several fold above the upper reference range, in the absence of bone or liver disease. ALP activity typically peaks at 6 weeks and normalises around 12 weeks. We present a rare case of presumed BTH in an adult.

Clinical Presentation: A 35 year old male with a history of cystic fibrosis (CF), cystic fibrosis diabetes (CFD), cystic fibrosis related liver disease (CFRLD) and autoimmune haemolytic anaemia was noted to have an ALP of 6400U/L (normal range 30-130U/L) on routine monitoring (previously persistently in the normal range). 2 weeks later this had risen to 14,090U/L. There was no history of systemic symptoms, bone pain, proximal myopathy or fracture. There had been no recent infection or new medications. Examination revealed CF related respiratory findings and longstanding splenomegaly.

Investigation: Gamma-glutamyl transferase and renal function were normal. Adjusted serum calcium was 2.19mmol/L (normal range 2.2-2.6mmol/L). Vitamin D and PTH were within range. The ALP isoenzyme electrophoresis revealed low heat stability suggesting that the enzyme was almost entirely of bone origin. The whole body planar bone scintigraphy findings were consistent with a 'superscan'. Subsequent myeloma screen, thyroid function, serum tryptase and insulin growth factor-1 were normal or below reference range. Skeletal X-rays were normal and bone marrow biopsy revealed no evidence of malignancy.

Management: A 'watch and wait' approach to management has been adopted. ALP has continued to fall without intervention (397U/L six weeks after the peak).

Discussion: Approximately 10 cases of adult BTH are reported in the literature. The clinical features in this case are in keeping with adult BTH. ALP is falling without intervention and despite extensive investigation there is no evidence of metabolic bone disease. However, the 'superscan' appearance has not been accounted for. Case reports in both the adult and paediatric literature have not previously described this finding. Investigations for haematological or metastatic malignancy are negative. Alternative explanations are being explored.

Final Oral Number: O04

Eun Ji Kim^{1,2}, Amelia Moore³, Dwight Dulnoan³, Geeta Hampson^{1,2,3}

¹Department of Chemical pathology and Metabolic Medicine, St Thomas' hospital, London, UK

²Metabolic bone clinic, Department of Rheumatology, Guy's Hospital, London, UK

³Osteoporosis Unit, Guy's Hospital, London, UK

EFFECT OF FIBROBLAST GROWTH FACTOR (FGF) 19 AND 21 ON HIP STRENGTH IN POST-MENOPAUSAL OSTEOPOROSIS (PMO)

Background: FGF receptor signaling is important for skeletal development. The FGF19 subfamily which includes FGF 19 and FGF 21 are involved in bone metabolism, although their effects on bone mineral density (BMD) and bone strength remain unclear.

Objective: To further characterise the influence of these 2 factors on the skeleton, we studied the association between circulating concentrations of FGF 19 and 21 with BMD and parameters of hip geometry and strength in post-menopausal osteoporosis (PMO).

Method: The study cohort consisted of 374 women aged (mean [SD]) 68.7[12.3] years with PMO. FGF 19 and FGF 21 were measured in serum by ELISA. BMD at the lumbar spine (LS), total hip (TH) and femoral neck (FN) (n=277) and hip structural analysis (HSA) parameters (n= 263) at the narrow neck of the femur (NN), Inter-trochanter (IT) and Femoral shaft (FS) were derived from DXA scans.

Results: FGF 19 and 21 were not associated with prevalent fractures or BMD when corrected for covariates; age, BMI, lifestyle factors. Among the HSA parameters, serum FGF 19 was negatively associated with sub-periosteal/outer diameter (OD) at the IT (IT:beta -0.141 $p=0.026$), cross-sectional area at the IT and FS (CSA) (IT:beta -0.180 $p=0.003$, FS:beta -0.137 $p=0.019$) and hip mechanical parameters; cross sectional moment of inertia (CSMI) (IT:beta -0.163 $p=0.009$, FS: beta -0.132 $p=0.031$) and section modulus (Z) (IT:beta -0.15 $p=0.013$, FS: beta -0.142 $p=0.017$). FGF 21 was also negatively associated with OD (IT:beta -0.188 $p=0.003$, FS:beta -0.15 $p=0.019$) endocortical diameter (ED) (IT:beta -0.14 $p=0.028$, FS: beta -0.126 $p=0.048$), CSA (IT:beta -0.176 $p=0.004$), CSMI (IT:beta -0.206 $p=0.001$, FS: beta -0.176 $p=0.004$), Z (IT:beta -0.221 $p<0.001$, FS: beta -0.167 $p=0.006$).

Discussion: Our data suggest that both FGF 19 and 21 may have potentially adverse effects on the skeleton. This may be related to the inhibitory effects of FGF 21 on osteoblastogenesis and FGF 19 on hepatic bile acid synthesis.

Conclusion: Further confirmatory studies are needed, particularly as FGF 21 analogues or agonists are used to treat metabolic disorders such diabetes mellitus and obesity.

Final Oral Number: O05

Pollie Ravji¹, Morven McRorie², Kathryn Berg², Stuart H Ralston^{1,2}, **Barbara Hauser^{1,2}**

¹Rheumatic Disease Unit, Western General Hospital, NHS Lothian, Edinburgh, UK

²Rheumatology and Bone Disease Unit, Centre for Genomic and Experimental Medicine, MRC institute of Genetics and Molecular Medicine, University of Edinburgh, Edinburgh, UK

PRIOR ANTIRESORPTIVE TREATMENT REDUCES LUMBAR SPINE BMD RESPONSE TO ROMOSUZUMAB IN CAUCASIAN POSTMENOPAUSAL WOMEN WITH SEVERE OSTEOPOROSIS

Introduction: Romosozumab is a newly licensed dual-acting osteoporosis (OP) treatment for patients at very high fracture risk. Most patients included in the pivotal trials were treatment naïve.
Objectives: To analyse BMD treatment response to Romosozumab in a real world cohort and to explore whether pre-treatment with antiresorptive osteoporosis medication (OPTx) influences the response at any BMD sites.

Methods: Retrospective single-centre analysis of patients who have completed a 12-month course of Romosozumab between February 2021 and November 2022. BMD assessment was usually performed at baseline and after treatment completion.

Results: Out of 56 patients who have been offered Romosozumab, 47 patients completed the full course of treatment. Four patients decided against starting Romosozumab, two patients developed side effects, two patients died (unknown cause) and one patient was lost to follow up. All patients were postmenopausal women with an average age of 73.1±9.7 years and baseline 10% major osteoporotic fracture risk was 32.2±13.5%. Mean baseline BMD T-score for lumbar spine (LS) was -3.8±1.0 and -3.0 ± 0.7 for total hip (TH). 31(66%) patients were treatment naïve or had recent antiresorptive treatment for less than 6 months, the remainder of patients received recently mostly oral or parenteral bisphosphonate treatment. After 12 months the overall mean % change BMD at the LS was 14.1±9.4 and 5.7±5.6 at the TH site. Spine BMD increase was significantly higher in treatment naïve patients than in patients who had previous OPTx over 6 months (17.3±9.0 vs 7.6±6.9; p<0.01). Prior OPTx however did not seem to influence TH BMD response to Romosozumab (5.1±6.3 vs 6.1±5.1 Txnaive). Age (r=-.37 p<.05; Spearman's rho) and prior OPTx (r= -.49 p<0.01) are inversely related to LS BMD increase. Multivariate regression analysis including age, baseline spine BMD and prior OPTx identified prior OPTx as independent predictor (betaSt= 0.422;p<0.05) of spine BMD response to Romosozumab treatment.
Conclusions: The overall BMD response at LS and TH site after 12 months Romosozumab treatment in real world is similar to that reported in the ARCH trial. Pre-treatment with antiresorptive treatment seems to significantly dampen the BMD response at the lumbar spine, which highlights the importance of the choice of OPTx sequence.

Conflicting Interests: Prof. Stuart Ralston reports research grants to his institution from Kyowa Kirin, AstraZeneca; donations of investigational medicinal products from Eli Lilly and Novartis to his institution for clinical trials; financial support to his institution for educational events from Pfizer, Abbvie, Kyowa Kirin, Alexion, Amgen, Cellgene, Bristol Myers Squibb, Janssen-Cilag, Novartis, Eli Lilly, Thornton & Ross, AstraZeneca, Sanofi Genzyme, Sandoz, and Roche; and financial support to his institution for consultancy work from UCB, all outside the submitted work. Dr. Hauser reports research grants to her institution from Novartis and consultancy fees from UCB outside the submitted work.

Final Oral Number: O06

Claire Holmes¹, David Hunt¹, Paul Cook¹, Madeleine Sampson¹, Rui Coutinho¹, Ellen Shepherd¹, Katie O'Donnell¹, Rebecca Moon¹, Kassim Javaid²

¹Rheumatology, University of Southampton NHS FT, Southampton, UK

²Rheumatology, Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Science, Oxford, UK

TYPES OF PATIENTS REFERRED TO A MULTIDISCIPLINARY ADULT RARE BONE DISEASE CLINIC: 4-YEAR EXPERIENCE

Background: The UK Rare Disease Framework prioritised faster diagnosis, care coordination, and access to specialist care. Many adult patients are managed in hospitals without rare bone disease expertise. To address this care gap, we have established a sustainable regional multidisciplinary model and present the results of the first four years.

Method: The clinic accepts referrals from primary and secondary care across the region, including transition from paediatric services. The team has developed to include two consultant rheumatologists (one from an established centre of excellence), a chemical pathologist, a geneticist, a physiotherapist, an occupational therapist, a specialist nurse and trainees. Clinics are coordinated by the nurse specialist. The clinic links to the regional (6 NHS trusts) monthly virtual multidisciplinary team (MDT) meeting and the national musculoskeletal genomics MDT. The clinic was held virtually during the pandemic; this approach has continued. Patients requiring clinical examination are reviewed in the general osteoporosis clinic.

Results: 59 patients have attended the clinic (see table). Twelve patients received a new diagnosis, of whom six have started treatment. Four of the five patients still under investigation have been referred to the Genomic Medicine Service. Of the 16 patients with previously diagnosed rare bone disease, 14 were recommended alternate treatment options, 1 stopped treatment, and 4 were referred to orthopaedics, with one subsequently diagnosed with chondrosarcoma. All patients with complex metabolic bone diseases were discharged to a general bone clinic with a management plan. Three patients were referred to the regional MDT and one to the national genomic MDT.

Discussion: The clinic demonstrated value in both diagnosis and management and as an essential education platform for trainees and the MDT. Our experience confirmed the specialist nurse's vital role in coordinating the clinic. Future work will describe the patient experience and satisfaction, particularly with the virtual clinic format.

Table: Diagnosis of patients referred to the clinic

New diagnoses made	Still undergoing investigation	Review of previously diagnosed patients	Complex metabolic bone	Referred to regional MDT	Referred to Genomic MDT
Alstrom's bone disease	Bone fragility	Fibrous dysplasia/ McCune Albright Syndrome (n=3)	Avascular necrosis and spontaneous fractures	Fibrous dysplasia (n=2)	Osteogenesis Imperfecta pattern
Cushing disease (pituitary adenoma)	Skeletal dysplasia (n=3)			Hypophosphatasia	
Familial expansile osteolysis	Slow fracture healing	Langerhans cell histiocytosis	Chronic kidney disease (n=2)		
Fibrous dysplasia (n=2)		Melorrheostosis	Atypical femoral fracture (n=5)		
Hypophosphatasia		Multiple Endocrine Neoplasia type 1 and multiple low trauma fractures	Unusual fracture pattern (n=7)		
Osteogenesis imperfecta (n=2)			Isolated Low Alkaline phosphatase		
Osteopetrosis		Multifocal carpal tarsal osteolysis	Subcutaneous calcification		
<i>PHEX</i> -related hypophosphatemic rickets		Olliers. New chondrosarcoma	Fragility fractures with active renal stone disease (n=2)		
Pregnancy Lactation Associated Osteoporosis		Osteogenesis imperfecta (n=3)	Synovitis, acne, pustulosis, hyperostosis, osteitis (SAPHO)		
Transient migratory osteoporosis		Spondylo-epithelial dysplasia			
		Systemic mastocytosis (n=3)	Scleroderma		
		Dyskeratosis congenita	Previous Acute lymphoblastic leukaemia & fracture		

Final Oral Number: O07

Rita Patel¹, Petra Baji¹, Jill Griffin², Sarah Drew¹, Tim Chesser³, M.Kassim Javaid⁴, Xavier Griffin⁵, Yoav Ben-Shlomo⁶, Elsa Marques¹, Andrew Judge¹, Antony Johansen⁷, **Celia Gregson¹**

¹Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK

²Clinical Engagement, Royal Osteoporosis Society, Bath, UK

³Department of Trauma and Orthopaedics, North Bristol NHS Trust, Bristol, UK

⁴Nuffield Department of Orthopaedics, University of Oxford, Oxford, UK

⁵Division of Orthopaedics, Queen Mary University of London, London, UK

⁶Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

⁷School of Medicine, Cardiff University and University Hospital of Wales, Cardiff, UK

PATIENT RECOVERY FOLLOWING HIP FRACTURE IS ASSOCIATED WITH MULTIPLE MODIFIABLE COMPONENTS OF HOSPITAL SERVICE DELIVERY IN ENGLAND AND WALES: THE REDUCE RECORD-LINKAGE COHORT STUDY

Background: Substantial variations remain in the delivery of hip fracture care across the United Kingdom despite well-established standards and guidelines. We aimed to predict adverse patient outcomes following hip fracture from modifiable hospital-level organisational factors and use findings to develop implementation tools to improve national hip fracture service delivery.

Methods: We used a national record-linkage cohort of 178,757 patients (age ≥ 60 years) with a hip fracture in England and Wales (2016–19). We linked patient-level hospital admissions, National Hip Fracture Database and mortality data with 231 metrics from 18 hospital-level organisational-level audits and reports. Multilevel models identified organisational factors, independent of patient case-mix, associated with patient outcomes: length of hospital stay, emergency 30-day readmission, 120-day mobility recovery, days in hospital and health costs over 365-days, and mortality (30- and 365-day) in 172 hospitals across England and Wales.

Results: Over one-year patients with mean (SD) age 83 (8.6) years, spent 31.7 (32.1) days in hospital, costing £14,642 (£9,017), and 50,354 (28.2%) died. We identified 46 key organisational factors independently associated with one or more patient outcome, of which 13 were (a) associated with cost and/or bed-day savings over one year, (b) consistently associated with other positive patient outcomes, and (c) potentially modifiable. Factors included weekend physiotherapy provision (mean saving per patient/year: £676 [95% CI: £67-1285]), orthogeriatrician assessment (£529 [£148-910]), direct admission to a hip fracture ward (3.4 [-0.36-7.07] days), regular dissemination of audit data to staff (0.85 [0.30-1.39] days). These data have informed the development of a hospital-specific cost-benefit calculator, with model business cases for service improvement, specialty checklists, audit and 'how to' guides for complex care delivery.

Conclusion: All hospitals should try to provide the best available hip fracture care equally across England and Wales. We identified multiple, potentially modifiable, organisational factors associated with important patient outcomes following hip fracture. Our practical and freely-available toolkit should help reduce variation in service delivery.

Final Oral Number: O08

Lamees Salman¹, David C Howlett¹, Karl J Drinkwater², Nadia Mahmood³, Jill Griffin⁴, M Kassim Javaid⁵, Ganesh Retnasingam⁶, Abdelaziz Marzoug⁷, Rebecca Greenhalgh⁸

¹Department of Radiology, Eastbourne Hospital, Eastbourne, UK

²Directorate of Education and Professional Practice, The Royal College of Radiologists, London, UK

³Department of Radiology, University Hospitals Sussex NHS Trust, Brighton, UK

⁴The Royal Osteoporosis Society, Bath, UK

⁵The Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Oxford, UK

⁶Department of Radiology, St Helens and Knowsley Teaching Hospitals NHS Trust, Prescot, UK

⁷Department of Radiology, Ninewells Hospital, Dundee, UK

⁸Department of Radiology, London North West University Healthcare NHS Trust, London, UK

RADIOLOGY REPORTING OF INCIDENTAL OSTEOPOROTIC VERTEBRAL FRACTURES COMPUTED TOMOGRAPHY STUDIES: RESULTS OF UK NATIONAL RE-AUDIT

Background: In 2019, the Royal College of Radiologists (RCR) collaborated with the Royal Osteoporosis Society (ROS) and the Royal College of Physicians (RCP) on a UK-wide audit to evaluate patient reporting and organisational infrastructure data in the diagnosis of osteoporotic vertebral fragility fractures (VFFs) on computed tomography (CT). Findings demonstrated overall lack of compliance with targets prompting a series of RCR-led interventions and local quality improvement by ROS. A 2022 re-audit was undertaken to reassess diagnostic performance and organisational practice.

Objective: Four selected headline standards for patient-specific questionnaires included: comment on integrity of the bones in primary report (target 100%), fracture severity assessment (target 90%), use of recommended terminology "vertebral fracture" in relation to described anomalies (target 100%) and recommendations for referral/further assessment (target 100%). Organisational aspects of the questionnaires were related to reporting provision, infrastructure and onward referral system.

Methods: Patient-specific questions involved analysis of CT reporting data acquired from 50 (maximum 100) consecutive non-traumatic studies including the thoracolumbar spine using Genant semi-quantitative approach. UK radiology departments with an RCR registered auditor were invited to participate in this retrospective audit.

Results: 129/194 (67%) departments supplied data from 7316 patients. 21.7% had a VFF on auditor review. Overall improvements were demonstrated in key initial reporting results; comment on spine/bone (93.2%, 14.4% point improvement) with an increase in departmental acquisition of sagittal bony reconstructions and spine/bone review (69.9%, 21.1 % point improvement); fracture severity assessment (34.7%, 8.5% point improvement); use of recommended terminology (67.8%, 7.5% point improvement); recommendations for further management (11.7%, 9.1% point improvement). Organisational responses showed generalised infrastructure improvement with an increase in both Fracture Liaison Service notification (47%; 20% point improvement) and access (44%, 7% point improvement). Selected new organisational responses in the 2022 re-audit showed 11% of departments appointed a radiology lead for osteoporosis and 38% of departments agreed a local policy for VFF reporting.

Conclusion: The 2022 national re-audit confirms improvement in diagnostic performance and organisational practice in VFF with scope to sustain and build on this progress.

Final Oral Number: O09

Maria Talla¹, Margaret French¹, Kay Johnstone¹, Angela Collie¹, Leigh Robertson¹, Mayrine Fraser¹, Kevin Milne², Gavin Glen³, Claire Cutt³, Alastair Robertson⁴, Pamela Fergusson⁴, Annie Sinclair⁵, Andrew Conkie⁵

¹Department of Endocrinology and Bone Metabolism, Queen Elizabeth University Hospital, NHS Greater Glasgow & Clyde, Glasgow, UK

²Clinical Research & Development, West of Scotland Safe Haven, Glasgow, UK

³Integration Team, NHS National Services Scotland, Glasgow, UK

⁴West of Scotland Innovation Team, NHS Greater Glasgow & Clyde, Glasgow, UK

⁵RedStar, Glasgow, UK

REDSTAR FLS – AN INNOVATIVE DIGITAL SOLUTION FOR FRACTURE LIAISON SERVICES IN NHS GREATER GLASGOW AND CLYDE

Background: The risk of a second fragility fracture is highest within the first 12-24 months following an index fracture. Secondary prevention of osteoporotic fractures requires an effective Fracture Liaison Service (FLS).

Objective: We sought to design an innovative digital solution to facilitate early identification of fractures through our radiology reporting system, and present this information to the clinician alongside other data relevant to FLS.

Methods: A text-based approach was deployed into the Cris Radiology Information System to identify radiology reports which meet pre-specified criteria for FLS. This algorithm runs daily, generating a list of unique patient identifiers which are then linked with biochemistry and historical radiology data from the Scottish Care Information (SCI) Store, alongside prescribing and bone densitometry data from the Safe Haven. This information is processed by the RedStar FLS application and displayed on a clinician dashboard. The data on the dashboard is assessed and actioned daily, generating an individualised care plan for each patient which may include a recommendation for treatment, bone densitometry, biochemical investigations, or further assessment at the clinic.

Results: We demonstrated a reduction in time to identification of vertebral fractures from 18 months down to 48 hours, with the average time to creation of a care plan of 12 hours. In terms of the number of patients with vertebral fractures identified compared to the predicted number based on the FLS-DB matrix, our automated audit tool shows that we are performing at 185%, and for all fragility fractures it is 124%. Electronic document transfer to Primary Care has resulted in an administrative time-saving of 28 hours per week.

Conclusion: The RedStar FLS system has introduced simplicity in combining multiple eHealth screens into a single screen with targeted radiology, laboratory and prescribing information. We have increased the number of patients identified and treated with the same clinical resource. Given the short time to identification of fragility fractures, we are able to take a targeted approach to prioritise patients at very high fracture risk for bone densitometry and assessment.

Alison Gowdy¹, Rebecca Low², Antony Panayiotidis³, Tracey Marriott¹, Muhammad Javaid^{2,4}

¹Oxford Academic Health Science Network, AHSN, Oxford, UK

²Oxfordshire Osteoporosis and Metabolic Bone Disease service, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

³PRIMIS, University of Nottingham, Nottingham, UK

⁴NDORMS, University of Oxford, Oxford, UK

PRIMARY CARE BASED OPTIMISATION OF ANTI-OSTEOPOROSIS MEDICATION ADHERENCE: GRASP OSTEOPOROSIS

Background: Fracture Liaison Services (FLS) are expected to reduce fractures but poor anti-osteoporosis medications (AOMs) adherence limits their effectiveness. Primary care IT systems present an opportunity to improve AOMs adherence.

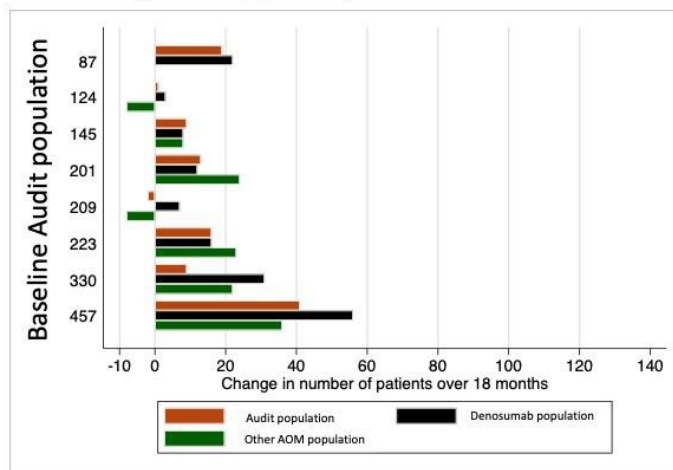
Objective: Describe the impact of a primary care adherence programme on AOM use and adherence.

Methods: A primary care AOM adherence programme was developed with experts from the University of Oxford, PRIMIS and the Oxford AHSN. It includes an EMIS-based search tool to flag adults with a history of fracture when aged 50 years and over and a prescription for an AOM in the last 5 years, but no prescription of an oral AOM for more than 3 months or denosumab for more than 6 months. Selected practices can also access online osteoporosis resources and quarterly calls with the local secondary care lead. Each practice ran five reports over 18 months between August 2021 and December 2022 to identify non-adherent patients requiring a medication review.

Results: Eight practices agreed to take part (median practice size 11,963 (range 4,423 to 40,499)). At baseline, there was significant variability between practices in the use of oral AOM (48%-70%) and denosumab (20%-32%) in the audit cohort. At the end of the project, QOF fracture coding increased by 21%, with an additional 252 patients on AOM therapy and a small nonsignificant increase in adherence to oral AOMs and denosumab between practices.

Discussion: The pilot demonstrated increases in QOF fracture coding, AOM prescribing and AOM adherence. Extrapolation to a general population of 1 million patients would lead to an additional 32,266 patients treated with AOM, with an estimated 1,162 avoided fractures (including 465 hip fractures) over 2 years. The reduction in hip fractures alone equates to a saving of £6,585,795 over 2 years. These findings support extending the programme to other primary care services.

Absolute change in audit population, denosumab and other AOM users from August 2021 to December 2022



Legend: Each row group is a different practice with the number representing the eligible audit population. E.g. 87 is the number of eligible patients for the service improvement project in the first GP practice

Conflicting Interests: In last three years received honoraria, unrestricted research grants, travel and/or subsistence expenses from: Amgen, Kyowa Kirin Hakin, UCB, Abbvie, Besin Healthcare, Sanofi

Qizhi Huang¹, Caroline Mitchell¹, Janet Brown²

¹Academic Unit of Primary Medical Care, University of Sheffield, Sheffield, UK

²Department of Oncology and metabolism, University of Sheffield, Sheffield, UK

ASSESSMENT AND MANAGEMENT OF FRACTURE RISK IN MEN WITH PROSTATE CANCER TAKING ANDROGEN DEPRIVATION THERAPY: A RETROSPECTIVE OBSERVATIONAL PRIMARY CARE DATABASE STUDY

Background: Osteoporosis is often underdiagnosed and undertreated in men. Prostate Cancer (PCa) is the commonest cancer in the UK with 1 in 8 affected in their lifetime. Androgen deprivation therapy (ADT) is a mainstay of treatment for PCa, and is a secondary cause for osteoporosis. NICE and NOGG guidelines recommend patients with PCa on ADT receive a fracture risk assessment.

Objectives: This retrospective multi-practice database study aimed to evaluate how fracture risk of patients with PCa on ADT was assessed and managed in primary care.

Methods: Registered patients with PCa were identified, using SNOMED codes, from five sociodemographically diverse practices (registered population 43,500). Data were extracted from records including hospital letters and included: demographics; ADT duration; a 10-year fragility fracture score (FRAX); NOGG intervention threshold; DEXA requests; use of bone protective agents (BPA). FRAX scores were compared using the t-test.

Results: 261 PCa patients: 6% black African/Caribbean, 89% white British; average age 75 years (range 50-93), 13% had metastatic PCa. Half of the patients had been prescribed ADT, 28% being current users. Average ADT duration was 41 months (3 months – 19 years). No fracture risk assessment was documented for any patients. ADT current users had significantly increased FRAX scores for both major osteoporotic fractures (MOF): $9.61\% \pm 1.12\%$ (mean \pm 95%CI), and hip fracture (HF): $5.30\% \pm 1.02\%$ compared with PCa patients without ADT: $7.08\% \pm 0.57\%$ (MOF) and $3.06\% \pm 0.46\%$ (HF) respectively, $p < 0.001$; RR were 1.36 and 1.73 for MOF and HF respectively. One patient had a high risk of osteoporosis (NOGG red) requiring BPA treatment; 55 patients (21%) showed moderate risk (NOGG amber), warranting a DEXA scan. Pre-existing osteoporosis/osteopenia was recorded in 13 (5%) patients, with 16 new cases post diagnosis. Overall 17 patients (6%) received BPA. Patients in more affluent areas tended to receive more DEXA scans and treatment.

Discussion: Men with PCa, on ADT have increased risks of osteoporosis, but they are under-diagnosis and under-treatment, especially in more deprived areas.

Conclusion: There is an unmet need to proactively manage the fracture prevention of men with PCa taking ADT.

Final Oral Number: O12

Kerrie Bethwaite¹, Zoe Paskins^{1,2}, Nicky Dale¹, Seeba Mathew¹, Ashley Hawarden^{1,2}

¹Midlands Metabolic Bone Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

²Haywood Academic Rheumatology Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

IMPLEMENTATION OF A VERTEBRAL FRACTURE PATHWAY TO IMPLEMENT ROMOSUZUMAB

Background: The Royal Osteoporosis Society (ROS) and National Osteoporosis Guideline Group (NOGG) consensus statement recommends prioritising Romosozumab in postmenopausal women with a history of major osteoporotic fracture within 24 months, bone-mineral density (BMD) defined osteoporosis and vertebral fracture.

Objective: To develop a rapid access vertebral fracture pathway to implement the NOGG/ROS advisory statement on Romosozumab prioritisation.

Methods: Post-menopausal women with a history of vertebral fracture are identified by the Fracture Liaison Service. Identified patients are invited for review in an advanced clinical practitioner rapid access vertebral fracture clinic. Clinic review includes a detailed history, bone density scan and relevant investigations. Patients are discussed in the vertebral fracture MDT and eligible treatment options determined. Patients subsequently attend a doctor-led vertebral fracture clinic to make an informed treatment decision.

Results: From January 2023-March 2023 a total of 63 patients were invited to the rapid access vertebral fracture clinic. 13 patients did not attend (DNA). 50 patients were subsequently discussed in the vertebral fracture MDT. 31 patients were ineligible for Romosozumab (T-score >-2.5 (20), grade 1 vertebral fracture only (2), cardiovascular disease (2), cerebrovascular disease (3), high trauma vertebral fracture (2), old vertebral fracture (1) and unavailable BMD (1)). Treatment was indicated in 26 of these patients and they were referred for zoledronate (19), alendronate (2), ibandronate (1), denosumab (1) and additional review in metabolic bone clinic (3). 19 patients were considered for Romosozumab and 13 patients have been referred to the doctor-led vertebral fracture clinic for treatment. 1 patient has commenced treatment, 2 patients declined treatment and 10 await review. Remaining patients were offered Teriparatide (2, cardiovascular risk), Zoledronate (4, cardiovascular risk).

Discussion: The vertebral fracture pathway has improved rapid access to Romosozumab. 62% of patients discussed in MDT were not eligible for Romosozumab. However, the pathway was still beneficial as it resulted in fast-tracking to alternative treatment strategies. Unfortunately, DNA rate was high (21%).

Conclusion: In our single-centre experience a fast-track vertebral fracture pathway is effective in aiding the prioritisation of Romosozumab. However, to operate effectively, it requires dedicated staff and protected clinic time.

Deborah Nelson¹, Elizabeth Thomas², Rose Stone¹, Julia Thomson¹, Rachel Ashcroft-Hands¹, Kirsty Carne¹, Vivienne Fairclough¹, Helen Gilmour¹, Niki Gonty¹, Claire Lewis¹, Tina Stoodley¹, Beverley Vale¹

¹Clinical Directorate, Royal Osteoporosis Society, Bath, UK

²Freelance medical writer, EThomas Research, Stockholm, Sweden

IMPACT OF A SPECIALIST NURSE TELEPHONE HELPLINE ON INTENTION TO INITIATE OR CONTINUE OSTEOPOROSIS MEDICATION

Background: Osteoporotic fractures are associated with morbidity, mortality and costs. Many people decline treatment over fears or misunderstandings about medication; however, contact with healthcare professionals (HCP) can support medication adherence. Data are presented from the 2022 service audit of a UK-wide osteoporosis specialist nurse helpline (OSNhelp), that annually responds to >13,000 *enquires*.
Objective: Explore the extent that contact with OSNhelp impacts callers' intention to initiate or persist with osteoporosis *treatment*.

Methods: A 2021 pilot study informed the survey design. Data was collected from 31st October to 2nd December 2022. Participants were recruited during helpline phone calls and validated surveys were subsequently provided to elicit quantitative and qualitative data on a range of topics.

Results: 273 participants returned surveys for analysis (49% response rate). Respondents were predominantly highly educated, affluent, white women >60 years old. 90% have osteoporosis and 58% also had fracture(s). 66% called about drug treatments, of whom 98% agreed the call helped them understand medication and why it was prescribed. 90% reported decreased concerns about side effects. 86% agreed the call helped them reach decisions to start or continue treatment. 33% decided against offered treatment, indicating the call prompted pursuit of alternative treatment options. 96% felt better prepared for conversations with HCP. Qualitative responses consistently show callers valuing the specialist expertise, empathetic and individualised support from OSNhelp; 10% reported barriers to accessing this from NHS sources.

Discussion: Seeking to understand drug treatments is the main reason people contact OSNhelp, perhaps reflecting the complex natures of treatment and increasing NHS pressures. Respondents reported contact with OSNhelp facilitated better understanding of treatment rationale, eased concerns about side effects and empowered some to self-advocate for alternative *treatment*.

Conclusion: Contact with OSNhelp impacts callers' perceptions of treatment in a meaningful and positive way. With diminishing NHS resources, patients who cannot access information and support they need to make genuinely informed choices often decline treatment. The OSNhelp, with highly experienced and expert nurses can support those who may otherwise fall through the treatment gap.

Corinne Birch^{1,2}

¹University of the West of England

²NHS Primary Care, Pier Health, Weston-super-Mare, UK

DEVELOPMENT OF AN INNOVATIVE DIGITAL QUESTIONNAIRE TO SCREEN ADULTS FOR RISKS OF OSTEOPOROSIS AND FALLS IN PRIMARY CARE BY A FIRST CONTACT PHYSIOTHERAPIST

Background: Socio-economic costs of hip fractures are formidable. Despite osteoporosis and falls being major risk factors, routine screening in Primary Care does not occur. Evidence for reducing hip fractures through screening older women for osteoporosis is growing. However, to make an even greater impact on the incidence of future hip fractures, it makes clinical and economic sense to screen for both fracture and falls risks at the same time.

Objective: This study evaluates the accuracy of an innovative digital questionnaire and computer programme to collect person-reported data, combine it with medical data, to calculate fracture and falls risks without the need for clinician time.

Methods: This study is a cross-sectional quantitative evaluation of adults identified at (1) high and medium risk of osteoporosis and (2) high risk of falls, using a web-based questionnaire and bespoke computer programme. Adults aged ≥ 65 years who had consented to receive electronic correspondence were included. Excluded were adults in nursing/residential care or receiving palliative care. Questionnaires were distributed via email or SMS over a 16-week period. Patient-reported information was combined automatically with existing medical data required to complete the FRAX® & FRAT (falls-risk assessment) tools. A robot computer function auto-populated and retrieved fracture risk scores from the FRAX® online tool. A report was generated with those at high and medium risk of fracture and at high risk of falls. *Results:* 632 (37%) of 1692 questionnaires were returned. Participant ages ranged from 65 to 92 years ($M=72.5$, $SD=5.7$), 47.8% identified as male and 52.2% female. Using NOGG UK Guidelines (2021), 217 (34%) adults were identified at amber and 46 (7%) at red fracture risk. 131 (20.7%) adults had fallen within the previous year and 122 (19%) had a high-risk FRAT score ≥ 3 . Personalised bone health and lifestyle advice was automatically delivered to all 632 adults.

Discussion: This automated screening process enables accurate identification of adults who are falling and/or at risk of osteoporosis and provides personalised bone health and lifestyle advice without the need for clinician time. Prevention of both falls and hip fractures should result in significant savings to the NHS and Social Care budget.

Neil Powrie¹, Elizabeth McLernon¹, Abbas Ismail²

¹Department of Radiology, Stockport NHS Foundation Trust, Stockport, UK

²Department of Rheumatology, Stockport NHS Foundation Trust, Stockport, UK

THE 4% FAT ERROR: A POTENTIAL SOURCE OF ERROR ON DXA SCANS

Background: The '4% fat error' has been identified as a potential cause of dramatic underestimation of BMD results from Lunar DXA scanners. The error arises from failure to correctly identify soft tissue in the DXA scan image. We present two cases as examples of the potential impact on patient management.

Clinical presentation: Case 1 was a 68 year old female, whose baseline scan was 3 years previously, with T-scores of -2.5 and -3.1 at the femoral neck and total hip. She was intolerant of oral bisphosphonates and had no further osteoporosis therapy. Her follow up showed a 25% increase in total hip BMD, T-scores were -1.5 and -1.8 at the femoral neck and total hip. Reanalysis found incorrect soft tissue mapping at baseline. Once corrected, baseline T-scores increased to -1.2 and -1.7, and there was no change in BMD exceeding the least significant change.

Case 2 was a 71 year old male. Three years previously, the patients hip T-scores were -4.5 and -3.5 at the femoral neck and total hip. Patient commenced Zoledronic acid. Follow up T-scores were -0.8 and 0.3. No percentage-comparison between measurements was possible due to a change in DXA equipment; however such a change in T-score is unusual. Examination of baseline scans showed no soft tissue pixels mapped. Once corrected, baseline T-scores were -0.6 and -0.2.

Management: Both cases had a misdiagnosis of osteoporosis. In case 1, effect on ongoing management was limited, as the patient was intolerant of oral bisphosphonates. Case 2 had an unnecessary course of Zoledronic acid. While no harm came to either patient, both patients were exposed to potential side effects from bisphosphonates. Both patients were made aware of the errors via the DXA scan report, with a clinical letter sent to the patient in case 2.

Discussion: Identification of the 4% fat error is essential to protect patients from harm. This risk can be mitigated by, 1. Routinely reviewing soft tissue mapping at the scan analysis stage, and 2. Routinely reviewing soft issue percentage fat. This information is usually noted in the footer of DXA scanprintouts.

Final Oral Number: O16

Naman Arora¹, Shree Muthukrishnan¹, Yuen Kang Tham¹, Bhagya Arun¹, Kavan Arora¹, Linda Scaloni¹, Johanna Wiles², Sophie Maggs¹, Amara Williams¹, Deb Collier³, Peter Carr⁴, Tracy Morgan³, Ketan Vegad¹, Non Pugh², Inderpal Singh¹

¹Geriatric Medicine, Aneurin Bevan University Health Board, Caerphilly, UK

²Rheumatology, Aneurin Bevan University Health Board, Newport, UK

³Medical Directorate, Aneurin Bevan University Health Board, Gwent, UK

⁴Executive Board, Aneurin Bevan University Health Board, Gwent, UK

QUALITY IMPROVEMENT INITIATIVES TO IDENTIFY AND MANAGE FRAGILITY FRACTURES IN A WELSH HEALTH BOARD

Background: Fracture liaison services (FLS) aim to prevent secondary fractures by ensuring high-quality care to all patients with fragility fractures above 50 years. Only 22.7% (n=879) patients were identified by the FLS team in 2021 (National average=40%).

Objective: To improve the identification and patient care with fragility fractures

Methods: A quality improvement methodology based on the model of improvement; Plan-Do-Study-Act cycles were used. Process mapping for the existing FLS service was completed. Ownership by the Medical Division and cross-divisional engagement through Clinical Leads: Rheumatology, Care of the Elderly (COTE), and Radiology were established. Falls and Bone Health Committee was set up at the executive level to drive the agenda for change. Partnership working with the Royal Osteoporosis Society (ROS) facilitated the FLS economic benefit calculations. FLS Database (FLS-DB) was used to review the improvement on a monthly basis.

Results: Process mapping supported the establishment of the two FLS-DB pathways: Rheumatology team to provide care for patients under 75 with the current Clinical Nurse Specialist (CNS) and COTE team to assess patients above 75 years. Medical Division funded two CNS for 12 months. Collaboration with the Radiology assisted to generate separate weekly fracture data for the rheumatology and COTE teams. FLS-DB identified 42.6% (n=1651) patients in the year 2022, an 88% increase as compared to the year 2021. A major improvement was observed in comparison to the previous year and also against the national benchmark: Spine fracture improved from 26% to 35% (National average=21%); Falls assessment improved from 35% to 81% (National average=61%) and Bone treatment improved from 58% to 66% (National average=54%)

Discussion: Collaboration with the ROS pursued Health Board's focus on the strategic planning for the FLS. Initial results of the pilot have supported the further extension of the pilot for another year with the aim of improving annual follow-up by engaging with the Primary Care. This pilot also highlights the importance of improving culture and multi-professional awareness of FLS.

Conclusion: The wider partnership working with ROS promoted cross-divisional engagement and gained stakeholder awareness of the FLS for our Health Board. This quality initiative has streamlined our rheumatology and COTE services which need further evaluation using Value-Based healthcare.

Neil Powrie¹, Elizabeth McLernon¹, Kieran Stancombe¹, Abbas Ismail²

¹Department of Radiology, Stockport NHS Foundation Trust, Stockport, UK

²Department of Rheumatology, Stockport NHS Foundation Trust, Stockport, UK

IS RADIOGRAPHIC OSTEOPENIA A VALID INDICATION FOR BONE DENSITOMETRY?

Background: 'Osteopenia', is a common finding on skeletal radiographs ("Radiographic osteopenia"), and a common indication for Bone Densitometry. Studies have shown osteoporosis on DXA is common in those with radiographic osteopenia. However a significant proportion of patients are not osteoporotic. NICE recommendations are that bone densitometry is not routinely performed without first performing a fracture risk assessment using FRAX.

Objective: We sought to determine the proportion of patients with radiographic osteopenia, who would be diagnosed with osteoporosis on DXA, and whether the DXA scan alters treatment decision in patients with radiographic osteopenia and low pre-BMD FRAX probabilities.

Methods: DXA scan reports between 01/08/21 and 28/02/22 were extracted from the radiology information system (n=2997). Those containing the phrase 'radiographic osteopenia' were selected (n=436, 15%). Those with other strong indications for DXA were excluded, leaving 190 reports; a further 4 were excluded where FRAX was unavailable (n=186).

The following data were collected or calculated; WHO diagnosis based on lowest T-score; FRAX probability with and without BMD; whether DXA was indicated using FRAX without BMD, Whether treatment was indicated using FRAX with BMD.

We aimed to investigate; 1. The proportion of patients with osteoporosis, based on their DXA as per WHO criteria; 2. The proportion of patients, in whom FRAX without BMD would not indicate a DXA, who would be eligible for treatment if DXA was performed.

Results : 28% of patients had Osteoporosis, 47% Low Bone Density (Densitometric Osteopenia), and 25% were in the normal range on their DXA scan.

Using FRAX without BMD included, DXA was not indicated in 118/186 (63%) of patients. Of these 19/118(16%) had fracture risk high enough to consider osteoporosis treatment if the DXA scan was subsequently performed anyway.

Conclusion: 16% of patients with radiographic osteopenia, but with FRAX probabilities not high enough for a DXA to be indicated, would have been eligible for osteoporosis treatment if the DXA was performed anyway and FRAX recalculated with BMD included. It is therefore felt that 'radiographic osteopenia' remains a valid indication for bone densitometry.

Brona Roberts, Lynsey Blair

¹Osteoporosis and Metabolic Bone Disease Service, Belfast Health and Social Care Trust, Belfast, UK

DXA REPORTING IN MEN: EFFECT OF CHOICE OF REFERENCE DATABASE

Background: Both the International Society of Clinical Densitometry and WHO recommend that T-scores in both men and women are calculated with reference to a female reference database, as fracture risk correlates better with absolute bone mineral density rather than sex-adjusted T-scores. FRAX also states that T-scores should be calculated as above. However anecdotal evidence suggests that most UK centres use sex-specific databases, and 2019 UK guidelines on this are vague, recommending simply that the choice of reference database be by “local agreement”.

Objective: To assess the effect of different reference databases on DXA reporting for both GE Lunar and Hologic scanners.

Methods: Fifty male patients’ scans, initially reported against a male reference database, were re-analysed against the female equivalent. The change in T-score and bone density classification were noted.

Results: Re-analysis of 25 GE Lunar scans against the female database produced a highly consistent increase of 0.6 in the hip T-score and 0.3 in the spinal T-score. When these patients were classified as osteoporotic, osteopenic or normal, 8/25 men were re-classified at one site and 2/25 at both. For Hologic scans, re-analysis led to an increase in T-score of 0.4 at both hip and spine. Of these 25 patients, 6 patients were re-classified at one site and one at both. In total, re-analysis of these 50 scans led to an increase in T-score in all cases, and 17 (34%) were given a different “diagnosis” at one or both sites.

Discussion: The choice of reference range for the reporting of male DXA scans makes a very significant change to calculated T-scores and to the proportion of men labelled as osteoporotic or osteopenic. Local variation in this results in over-diagnosis of men with osteoporosis (as defined by WHO), and presumably also wide variation in clinical practice in the management of men with suspected osteoporosis. Using female reference databases for all, as is recommended, would also answer effectively the question of DXA reporting in transgender individuals.

Conclusion: UK authorities should seek to standardise DXA reporting in accordance with scientific reasoning and international guidelines.

Final Oral Number: O19

Thomas Oldfield, Jordan Altimimi

¹Warwick Medical School, University of Warwick, Coventry, UK

AN AUDIT OF BISPHOSPHONATE PRESCRIBING AND MONITORING IN PRIMARY CARE

Background: National Osteoporosis Guidelines Group (NOGG) guidance¹ recommends oral bisphosphonate (BP) treatment review at 5 years as pauses may be appropriate for low fracture risk patients to ensure treatment risks and benefits are balanced.

Objective: This audit investigated adherence to the following standard in a rural GP practice: 100% of patients taking a BP for 5 years are reviewed (+/- 6 months) with a FRAX and BMD assessment, unless they met criteria specified by NOGG at their 5-year review.

Methods: Patients commenced on BPs between 01/07/2008-11/05/2017 were identified from current patient records using an EMIS programme search. Patients who had discontinued treatment within 5 years were excluded. The clinical records of the remainder were reviewed.

Results: 82 patients were identified, 44 had discontinued treatment within 5 years (3 due to side effects, 1 due to non-adherence, 40 not documented). 38 patients were on treatment for 5+ years, median age 76 years (range 48-99). 7 patients were on treatment for 10+ years. 21/38 (55%) patients satisfied criteria allowing continuation of therapy without FRAX or BMD assessment (4 due to a previous hip or vertebral fracture, 3 due to a low trauma fracture during treatment, 16 were aged >75, 4 were on daily prednisolone ≥ 7.5 mg). It was unclear from the records whether this had been formally assessed. Of the remaining 17 patients, only 5 (29%) received a FRAX or BMD assessment within the correct timeframe and 5/17 (29%) had no assessment at all.

Conclusion: Only 26/38 (68%) patients met the standard for this audit, and 29% of patients who may have qualified for a treatment pause had no assessment. Documentation regarding treatment plans and assessments was poor. This audit suggests BP prescribing performance can be improved in this practice to reduce potential harm and unnecessary prescriptions. Further assessment of why >50% of current patients discontinued treatment before reaching 5 years is required. A flagging system using EMIS was recommended to review patients on BPs at 5 and 10 years, and infographics will be used to alert the clinician to NOGG guidance. The importance of appropriate documentation was also highlighted. 1.) <https://www.nogg.org.uk/full-guideline>

Jane Fleming^{1,2}, Danuta Puchacz-Kadioglu¹, Karen Blesic¹, Phil Gorman¹, Maria Caracul Uroz¹, Jessica Taylor¹, Zoe Reyes³, Christopher Chan⁴, Madhavi Vindlacheruvu⁵

¹Addenbrooke's Hospital Fracture Liaison Service, Department of Rheumatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

²Cambridge Public Health, University of Cambridge, Cambridge, UK

³Department of Physiotherapy, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK ⁴Metabolic Bone Unit, Department of Rheumatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁵Department of Medicine for the Elderly, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

PATIENT REPORTED EXERCISE ACTIVITY AND PHYSIOTHERAPY INPUT FOLLOWING FRAGILITY FRACTURE PRE- AND POST-PANDEMIC: EVALUATION OF COVID-19 IMPACTS USING FRACTURE LIAISON SERVICE CLINIC DATA

Background: Effects of Covid-19 pandemic lockdowns and health service pressures on older people's mobility are acknowledged but difficult to quantify. Our Fracture Liaison Service (FLS) was aware of local impacts on access to services to which we refer patients. Routine FLS follow-ups include assessment of need for falls prevention/physiotherapy/exercise classes. *Objectives:* To examine pre-/post-Covid-19 physiotherapy and exercise participation using clinic data. *Methods:* Retrospective notes review (2019-2021) and prospective documentation (2022) measuring patients' physiotherapy input and exercise level 3-4 months post-fracture. *Results:* We identified 7,000 fragility fracture patients over the four years January 2019-December 2022. 2,539 were discharged after DEXA and fracture risk assessment or because they lived 'out of area' for our service. 428 died before their follow-up and 215 could not be contacted. 3816 patients had 4-month follow-up telephone appointments (50:50 aged 50-75 and >75 years old). Almost all 2019 patients' 3-4 month follow-ups were completed before late March 2020's first lockdown. Across 2019-2021 >40% reported they had not seen any physiotherapist since their fracture, including a small but rising fraction referred but still awaiting assessment. Both proportions fell by over half in 2022. There was a doubling of the proportion of patients who reported that their only NHS advice regarding exercise following their fracture was from an exercise leaflet (2019: 7.5%, 2022: 15%) Use of private physiotherapy was uncommon but increased steeply (2019: 1%, 2021: 6%) and significantly in both age-groups ($p=0.03$ and $p<0.01$). Most had had no NHS physiotherapy but 42% sought private physiotherapy after some NHS physiotherapy, feeling that was insufficient. Patients reported that they exercised regularly or were physically active significantly less commonly during 2020 and 2021 than in 2019 ($p=0.01$) or in 2022 ($p<0.001$), while proportions reporting inactivity/low activity levels or saying they only exercised occasionally rose in 2020-2021. This pattern was markedly clearer amongst >75-year-olds ($p<0.001$) than at younger ages (non-significant). Pre-pandemic 12.5% of patients reported attending exercise groups as well as regular home exercising, drastically reduced to only 1% in 2022. *Conclusion:* Although reported home exercise/activity engagement increased since lockdowns, community-based exercise groups important for fall prevention appear struggling to re-establish after Covid-19 restrictions.

ROS 2023

Posters

Neil Powrie¹, Elizabeth McLernon¹, Abbas Ismail²

¹Department of Radiology, Stockport NHS Foundation Trust, Stockport, UK

²Department of Rheumatology, Stockport NHS Foundation Trust, Stockport, UK

THE 4% FAT ERROR: A POTENTIAL SOURCE OF ERROR ON DXA SCANS

Background: The '4% fat error' has been identified as a potential cause of dramatic underestimation of BMD results from Lunar DXA scanners. The error arises from failure to correctly identify soft tissue in the DXA scan image. We present two cases as examples of the potential impact on patient management.

Clinical presentation: Case 1 was a 68 year old female, whose baseline scan was 3 years previously, with T-scores of -2.5 and -3.1 at the femoral neck and total hip. She was intolerant of oral bisphosphonates and had no further osteoporosis therapy. Her follow up showed a 25% increase in total hip BMD, T-scores were -1.5 and -1.8 at the femoral neck and total hip. Reanalysis found incorrect soft tissue mapping at baseline. Once corrected, baseline T-scores increased to -1.2 and -1.7, and there was no change in BMD exceeding the least significant change.

Case 2 was a 71 year old male. Three years previously, the patients hip T-scores were -4.5 and -3.5 at the femoral neck and total hip. Patient commenced Zoledronic acid. Follow up T-scores were -0.8 and 0.3. No percentage-comparison between measurements was possible due to a change in DXA equipment; however such a change in T-score is unusual. Examination of baseline scans showed no soft tissue pixels mapped. Once corrected, baseline T-scores were -0.6 and -0.2.

Management: Both cases had a misdiagnosis of osteoporosis. In case 1, effect on ongoing management was limited, as the patient was intolerant of oral bisphosphonates. Case 2 had an unnecessary course of Zoledronic acid. While no harm came to either patient, both patients were exposed to potential side effects from bisphosphonates. Both patients were made aware of the errors via the DXA scan report, with a clinical letter sent to the patient in case 2.

Discussion: Identification of the 4% fat error is essential to protect patients from harm. This risk can be mitigated by, 1. Routinely reviewing soft tissue mapping at the scan analysis stage, and 2. Routinely reviewing soft issue percentage fat. This information is usually noted in the footer of DXA scanprintouts.

Final Poster Number: P2

Ashley Hawarden^{1,3}, Laura Barlow², Mohammed Okour², Giles Fitch², Angela McGowan², Caitlyn Dowson^{1,3}, Zoe Paskins^{1,3}

¹School of Medicine, Keele University, Staffordshire, UK

²Respiratory Department, University Hospitals of North Midlands NHS Trust, Staffordshire, UK

³Haywood Academic Rheumatology Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

AN UNUSUAL CASE OF EXTREMELY ELEVATED ALKALINE PHOSPHATASE IN AN ADULT

Background: Benign transient hyperphosphatasia (BTH) is a condition that typically affects children. It is characterised by a marked increase in serum alkaline phosphatase (ALP) activity, several fold above the upper reference range, in the absence of bone or liver disease. ALP activity typically peaks at 6 weeks and normalises around 12 weeks. We present a rare case of presumed BTH in an adult.

Clinical Presentation: A 35 year old male with a history of cystic fibrosis (CF), cystic fibrosis diabetes (CFD), cystic fibrosis related liver disease (CFRLD) and autoimmune haemolytic anaemia was noted to have an ALP of 6400U/L (normal range 30-130U/L) on routine monitoring (previously persistently in the normal range). 2 weeks later this had risen to 14,090U/L. There was no history of systemic symptoms, bone pain, proximal myopathy or fracture. There had been no recent infection or new medications. Examination revealed CF related respiratory findings and longstanding splenomegaly.

Investigation: Gamma-glutamyl transferase and renal function were normal. Adjusted serum calcium was 2.19mmol/L (normal range 2.2-2.6mmol/L). Vitamin D and PTH were within range. The ALP isoenzyme electrophoresis revealed low heat stability suggesting that the enzyme was almost entirely of bone origin. The whole body planar bone scintigraphy findings were consistent with a 'superscan'. Subsequent myeloma screen, thyroid function, serum tryptase and insulin growth factor-1 were normal or below reference range. Skeletal X-rays were normal and bone marrow biopsy revealed no evidence of malignancy.

Management: A 'watch and wait' approach to management has been adopted. ALP has continued to fall without intervention (397U/L six weeks after the peak).

Discussion: Approximately 10 cases of adult BTH are reported in the literature. The clinical features in this case are in keeping with adult BTH. ALP is falling without intervention and despite extensive investigation there is no evidence of metabolic bone disease. However, the 'superscan' appearance has not been accounted for. Case reports in both the adult and paediatric literature have not previously described this finding. Investigations for haematological or metastatic malignancy are negative. Alternative explanations are being explored.

Final Poster Number: P3

Karen Matthews¹, Laura Fregonese¹, Becca Freeden¹, Kim Christie¹, Thomas Duncan², Anton Winters², Ross MacKay¹, Kome Bona-Idollo¹

¹School of Health Sciences, Queen Margaret University, Edinburgh, UK

²School of Arts, Social Sciences and Management, Queen Margaret University, Edinburgh, UK

VIDEO: CONSIDERING BONE HEALTH AND FRAGILITY IN MOVING AND HANDLING ACTIVITIES

Background: Previous research has identified reduced awareness of osteoporosis, and the risk of fragility fractures, when performing moving and handling activities, among Healthcare Professionals. *Objectives:* The objective of the project is to increase awareness of osteoporosis as a prevalent public health concern, and to educate healthcare workers and students to “think osteoporosis” when moving and handling persons.

A person-centred approach is aimed for. In discussing the individual’s personal preferences, healthcare workers can consider a person’s choices and abilities, and over-handling can be reduced. The videos demonstrate consideration of each individual’s ways of doing, ways of moving, and what matters the most to them.

The videos aim to encourage consideration of an individual’s right to take risks, positive risk-taking and dynamic risk assessment, keeping the person at the centre of their care.

Educational video presentations: Three short educational videos were produced. The first example, 'from lying to standing', shows a person lying in bed and needing to go to the toilet. She tries initially to move to sitting using her own technique but finds it doesn't work on the first attempt. The healthcare worker helps, using the bed controls and giving some advice, and then the person is able to stand up by herself with the bed at the correct height for this. The second example, teaching hip hinge', is a demonstration of the "how to, not don't do" approach for bending and lifting. The healthcare worker demonstrates the hip hinge, a slight bend of the knees, sticking the bottom back and bending from the hips, rather than the back. In the final example, a person is stuck in her chair and needs help to get up. She struggles to manage this herself, and the healthcare workers negotiate to work out the best way to help her to stand, with the assistance of two in this instance and checking that she has her balance before walking off. *Conclusion:* These videos aim to help healthcare workers and students consider bone health in their everyday moving and handling activities.

Final Poster Number: P4

WITHDRAWN

Final Poster Number: P5

Claire Holmes¹, David Hunt¹, Paul Cook¹, Madeleine Sampson¹, Rui Coutinho¹, Ellen Shepherd¹, Katie O'Donnell¹, Rebecca Moon¹, Kassim Javaid²

¹Rheumatology, University of Southampton NHS FT, Southampton, UK

²Rheumatology, Nuffield Department of Orthopaedics, Rheumatology & Musculoskeletal Science, Oxford, UK

TYPES OF PATIENTS REFERRED TO A MULTIDISCIPLINARY ADULT RARE BONE DISEASE CLINIC: 4-YEAR EXPERIENCE

Background: The UK Rare Disease Framework prioritised faster diagnosis, care coordination, and access to specialist care. Many adult patients are managed in hospitals without rare bone disease expertise. To address this care gap, we have established a sustainable regional multidisciplinary model and present the results of the first four years.

Method: The clinic accepts referrals from primary and secondary care across the region, including transition from paediatric services. The team has developed to include two consultant rheumatologists (one from an established centre of excellence), a chemical pathologist, a geneticist, a physiotherapist, an occupational therapist, a specialist nurse and trainees. Clinics are coordinated by the nurse specialist. The clinic links to the regional (6 NHS trusts) monthly virtual multidisciplinary team (MDT) meeting and the national musculoskeletal genomics MDT. The clinic was held virtually during the pandemic; this approach has continued. Patients requiring clinical examination are reviewed in the general osteoporosis clinic.

Results: 59 patients have attended the clinic (see table). Twelve patients received a new diagnosis, of whom six have started treatment. Four of the five patients still under investigation have been referred to the Genomic Medicine Service. Of the 16 patients with previously diagnosed rare bone disease, 14 were recommended alternate treatment options, 1 stopped treatment, and 4 were referred to orthopaedics, with one subsequently diagnosed with chondrosarcoma. All patients with complex metabolic bone diseases were discharged to a general bone clinic with a management plan. Three patients were referred to the regional MDT and one to the national genomic MDT.

Discussion: The clinic demonstrated value in both diagnosis and management and as an essential education platform for trainees and the MDT. Our experience confirmed the specialist nurse's vital role in coordinating the clinic. Future work will describe the patient experience and satisfaction, particularly with the virtual clinic format.

Table: Diagnosis of patients referred to the clinic

New diagnoses made	Still undergoing investigation	Review of previously diagnosed patients	Complex metabolic bone	Referred to regional MDT	Referred to Genomic MDT
Alstrom's bone disease	Bone fragility	Fibrous dysplasia/McCune Albright Syndrome (n=3)	Avascular necrosis and spontaneous fractures	Fibrous dysplasia (n=2)	Osteogenesis Imperfecta pattern
Cushing disease (pituitary adenoma)	Skeletal dysplasia (n=3)			Hypophosphatasia	
Familial expansile osteolysis	Slow fracture healing	Langerhans cell histiocytosis	Chronic kidney disease (n=2)		
Fibrous dysplasia (n=2)		Melorrheostosis	Atypical femoral fracture (n=5)		
Hypophosphatasia			Unusual fracture pattern (n=7)		
Osteogenesis imperfecta (n=2)		Multiple Endocrine Neoplasia type 1 and multiple low trauma fractures	Isolated Low Alkaline phosphatase		
Osteopetrosis					
<i>PHEX</i> -related hypo-phosphatemic rickets		Multifocal carpal tarsal osteolysis	Subcutaneous calcification		
Pregnancy Lactation Associated Osteoporosis		Olliers. New chondrosarcoma	Fragility fractures with active renal stone disease (n=2)		
Transient migratory osteoporosis		Osteogenesis imperfecta (n=3)	Synovitis, acne, pustulosis, hyperostosis, osteitis (SAPHO)		
		Spondylo-epithelial dysplasia			
		Systemic mastocytosis (n=3)	Scleroderma		
		Dyskeratosis congenita	Previous Acute lymphoblastic leukaemia & fracture		

Neil Powrie¹, Elizabeth McLernon¹, Kieran Stancombe¹, Abbas Ismail²

¹Department of Radiology, Stockport NHS Foundation Trust, Stockport, UK

²Department of Rheumatology, Stockport NHS Foundation Trust, Stockport, UK

IS RADIOGRAPHIC OSTEOPENIA A VALID INDICATION FOR BONE DENSITOMETRY?

Background: ‘Osteopenia’, is a common finding on skeletal radiographs (“Radiographic osteopenia”), and a common indication for Bone Densitometry. Studies have shown osteoporosis on DXA is common in those with radiographic osteopenia. However a significant proportion of patients are not osteoporotic. NICE recommendations are that bone densitometry is not routinely performed without first performing a fracture risk assessment using FRAX.

Objective: We sought to determine the proportion of patients with radiographic osteopenia, who would be diagnosed with osteoporosis on DXA, and whether the DXA scan alters treatment decision in patients with radiographic osteopenia and low pre-BMD FRAX probabilities.

Methods: DXA scan reports between 01/08/21 and 28/02/22 were extracted from the radiology information system (n=2997). Those containing the phrase ‘radiographic osteopenia’ were selected (n=436, 15%). Those with other strong indications for DXA were excluded, leaving 190 reports; a further 4 were excluded where FRAX was unavailable (n=186).

The following data were collected or calculated; WHO diagnosis based on lowest T-score; FRAX probability with and without BMD; whether DXA was indicated using FRAX without BMD, Whether treatment was indicated using FRAX with BMD.

We aimed to investigate; 1. The proportion of patients with osteoporosis, based on their DXA as per WHO criteria; 2. The proportion of patients, in whom FRAX without BMD would not indicate a DXA, who would be eligible for treatment if DXA was performed.

Results : 28% of patients had Osteoporosis, 47% Low Bone Density (Densitometric Osteopenia), and 25% were in the normal range on their DXA scan.

Using FRAX without BMD included, DXA was not indicated in 118/186 (63%) of patients. Of these 19/118(16%) had fracture risk high enough to consider osteoporosis treatment if the DXA scan was subsequently performed anyway.

Conclusion: 16% of patients with radiographic osteopenia, but with FRAX probabilities not high enough for a DXA to be indicated, would have been eligible for osteoporosis treatment if the DXA was performed anyway and FRAX recalculated with BMD included. It is therefore felt that ‘radiographic osteopenia’ remains a valid indication for bone densitometry.

Final Poster Number: P7

Priyanka Lakhani, Judith Bubbear, **Richard Keen**

¹Metabolic Bone Unit, Royal National Orthopaedic Hospital, Stanmore, UK

BONE HEALTH IN ADULT PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY (DMD)

Background/aims: Patients with DMD have low bone mineral density (BMD), leading to increased fracture risk. Risk factors include glucocorticoid use, decreased mobility, progressive muscle weakness, and hypogonadism.

Methods: Data were collected retrospectively from the clinical notes of adult patients who had been referred to our service.

Results: In total, data was available on 31 patients (average age 21.8 years). The mean age of developing immobility was 12 years. 90% were on corticosteroids; including prednisolone (n=21) and deflazacort (n=7). Half of patients (54%) followed the regime of 10 days on/10 days off. 29% of patients had a history of delayed puberty.

28 (90%) patients had a baseline DXA scan result available at time of referral. 7 patients had previous spinal surgery so analysis at the lumbar spine was possible only possible in 21 patients (mean lumbar spine Z score --2.46). Hip analysis was only possible in 11 subjects, with a mean femoral neck Z score of -3.42). 25 patients had a spinal x-ray at baseline. Scoliosis was seen in 17 patients. Almost half had prevalent vertebral fractures (48%). Non-vertebral fractures were reported in 14 patients. 84% of patients were on treatment. The most common treatment was IV Zoledronate (n=17). Other treatments included denosumab (n=5) and oral bisphosphates (n=4). No patients were taking anabolic treatment. There were no reports of fractures occurring after commencing treatment.

Conclusion: Bone health is compromised in adult patients with DMD with evidence of low bone density and a high fracture burden. Assessments such as hip DXA are difficult, and spine results may be affected by scoliosis and vertebral fractures. There is no consensus on the optimal management of these patients, although guidelines have been recently published (1). Longitudinal studies will be needed to assess the impact of bone protection treatment in this adult population. In addition, the practicality and reproducibility of serial radiological imaging remains to be determined. *References*

Birnkrant DJ, Bushby K, Bann CM, Alman BA, Apkon SD, Blackwell A, et al. Diagnosis and management of Duchenne muscular dystrophy, part 2: Respiratory, cardiac, bone health, and Orthopaedic Management. *The Lancet Neurology*. 2018;17(4):347–61.

Charlotte Taderera¹, Sara Lowe^{1,2}, Tinei Shamu^{1,3,4}, Celia L Gregson^{5,6}

¹Medicine, Newlands Clinic, Harare, Zimbabwe

²School of Medicine, University of Zimbabwe, Harare, Zimbabwe

³Institute of Preventive Medicine, University of Bern, Bern, Switzerland

⁴Graduate School of Health Sciences, University of Bern, Bern, Switzerland

⁵Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK

⁶The Health Research Unit Zimbabwe, Biomedical Research and Training Institute, Harare, Zimbabwe

FRAILITY, FALLS AND FRACTURE RISK IN OLDER PEOPLE LIVING WITH HIV; FINDINGS FROM AN INTEGRATED HIV-GERIATRIC CLINIC IN ZIMBABWE

Introduction: HIV is associated with increased osteoporosis risk, exacerbated by common HIV treatments such as tenofovir disoproxil fumarate (TDF). Furthermore, in Southern Africa HIV increases the risk of underweight/malnutrition, and potentially frailty, although data are scarce.

Objective: To characterise frailty, falls and fracture risk in older people living with HIV (OPLHIV) routinely attending an HIV clinic in Harare, Zimbabwe.

Method: OPLHIV were referred to a newly established, Integrated HIV-Geriatric Clinic (IHGC) for comprehensive assessment informed by the WHO integrated care of older people guidelines (ICOPE). A questionnaire was administered, weight and height measured, short physical performance battery (SPPB) performed and routine blood tests done. The Fracture Risk Assessment tool (FRAX) score was calculated. Summary statistics were calculated, including median (interquartile range [IQR]).

Results: Between October 2022 and March 2023, 62 patients were reviewed: 69% female, median age 69 years (IQR 67-72), median BMI 27 (IQR 22-30) kg/m². Only one woman was underweight, whilst 38 (61%) were overweight/obese. Patients had received HIV care for median 15.9 years (IQR 13.6-17.8). HIV was well suppressed in 58 (94%) (viral loads <50copies/ml). All but 3 (4.8%) had taken TDF, with median duration 36 months (IQR 20-46).

Overall, 56 (90%) patients had chair stand test scores ≤ 3 . 40 (65%) scored ≤ 9 on SPPB, suggesting frailty. 5 women and 1 man reported a fall in the last 12 months. 17 (28%) had a corrected calcium ≤ 2.2 mmol/l suggesting possible vitamin D deficiency.

The FRAX 10-year probability of major osteoporotic fracture was <10% in all (using the new proxy Zimbabwean tool), whilst hip fracture probability exceeded 3% in only 3 women. Despite low FRAX probabilities, 6 (9.7%) had a history of fragility fracture, all these were female with impaired SPPB.

Conclusion: Frailty is common in this ageing, overweight population living with HIV. The current Zimbabwean proxy FRAX tool may underestimate fragility fracture risk in those with HIV. OPLWH should undergo a musculoskeletal assessment, including consideration of bisphosphonate treatment. Assessment of all 638 OPLHIV at the clinic is in progress.

Jill Griffin

¹Clinical Engagement, Royal Osteoporosis Society, Bath, UK

EFFECTIVENESS OF A NATIONAL DXA TRAINING PROGRAMME FOR QUALITY BMD MEASUREMENTS

Background: DXA is an x-ray technique used to measure bone mineral density (BMD). Measurements are used to inform diagnoses, aligned with WHO criteria, refine fracture risk assessments, and monitor BMD changes. DXA is nuanced in that patients must be positioned correctly according to recognised standards, and the scan analysed according to specific criteria. Failure to do either of these increases precision error resulting in unreliable diagnoses and fracture risk assessments, and spurious rates of change impacting directly on patient outcomes.

Methods: 355 pre training scans were selected randomly from 22 referred national training programme (NTP) student portfolios and a training naïve DXA service and compared to 531 post training DXA scans. Images of the spine and proximal femur were audited for compliance to the standards for passing the NTP portfolio (pass 70% merit 71-89% and distinction 90%).

Results: Pre training: scan positioning was compliant to the standards in 57.14% at the spine and 62.50% at the femur. Following training positioning was compliant to standards in 86.97% of the spine scans and in 97.67% of the femur scans. For scan analysis 70.75% of spine scans were compliant to standards, and 78.99% at the femur pre-training. Following training analysis was compliant at the spine in 95.98% of cases and 92.59% at the femur. Combined positioning for both sites pre training was 59.82% and 92.32% post training, with combined analysis 74.87% pre training and 94.29% post training.

Discussion: Prior to training completion more than 40% of scans were not positioned correctly. Even where scans were correctly positioned a quarter of scans were not analysed reliably. NTP completion resulted in big increases in scan and measurement reliability, particularly at the positioning of the femur with more than a 30-point increase in reliability and analysis of the spine with more than 25-point increase.

Conclusion: NTP is effective in improving DXA scan positioning and analysis. This is important for reliable diagnoses of patients and improving fracture risk prediction, and accurate monitoring of changes in BMD over time to inform management decisions regarding therapy initiation, cessation, or change.

Sarah Beverley

¹Physiotherapy, Ashford and St Peter's Hospitals NHS Foundation Trust, Ashford, UK

IMPROVING PROMOTION OF PHYSICAL ACTIVITY BY PHYSIOTHERAPISTS, WITH PARTICULAR REFERENCE TO EXERCISE FOR HEALTHY BONES

Background: Physical activity (PA) plays a significant role in the prevention and management of osteoporosis. However, 33% of adults don't achieve the recommended levels. Physiotherapists are ideally placed to promote PA, supported by the UK Chief Medical Officer's Physical Activity Guidelines. This service improvement project began when patients highlighted a local lack of written information on exercise for healthy bones. This generated wider discussion in our department about poor promotion of PA by physiotherapists, and limited knowledge of the PA Guidelines. A larger project evolved, utilising the 'plan, do, study, act' cycle.

Objective: To improve the promotion of physical activity by physiotherapists, with particular reference to exercise for healthy bones.

Methods: Four smaller projects met the project's overall objective. Firstly, an evidence-based patient information leaflet was written – 'Exercise for Healthy Bones'. Secondly, an audit was undertaken to explore whether our physiotherapists provided advice conforming to the PA Guidelines. Thirdly, based on the audit results, a week-long learning-event was organised to improve physiotherapists' understanding of the PA Guidelines and Exercise for Healthy Bones leaflet. Fourthly, one week later, a survey was conducted to re-assess physiotherapists' knowledge of the guidelines and leaflet, and their confidence promoting them.

Results: The audit showed historically, physiotherapists advised only 54% of patients to be active, 90% to build strength, and 9% to improve balance. At best, only 11% of patients were advised on activity frequency. This highlighted limited understanding and application of the PA Guidelines, so the learning-event was organised. The survey following this, showed 100% of respondents were now aware of the PA Guidelines and Exercise for Healthy Bones leaflet. 95% now felt confident discussing PA for bone health with patients.

Discussion: This project improved understanding and promotion of PA by physiotherapists, with particular reference to exercise for healthy bones. It has aligned clinical practice to the PA Guidelines.

Conclusion: Better promotion of PA has improved patients' current bone health. It's also empowered them to live-well in the longer-term, potentially preventing osteoporosis, therefore reducing future healthcare needs and costs.

Brona Roberts, Lynsey Blair

¹Osteoporosis and Metabolic Bone Disease Service, Belfast Health and Social Care Trust, Belfast, UK

DXA REPORTING IN MEN: EFFECT OF CHOICE OF REFERENCE DATABASE

Background: Both the International Society of Clinical Densitometry and WHO recommend that T-scores in both men and women are calculated with reference to a female reference database, as fracture risk correlates better with absolute bone mineral density rather than sex-adjusted T-scores. FRAX also states that T-scores should be calculated as above. However anecdotal evidence suggests that most UK centres use sex-specific databases, and 2019 UK guidelines on this are vague, recommending simply that the choice of reference database be by “local agreement”.

Objective: To assess the effect of different reference databases on DXA reporting for both GE Lunar and Hologic scanners.

Methods: Fifty male patients’ scans, initially reported against a male reference database, were re-analysed against the female equivalent. The change in T-score and bone density classification were noted.

Results: Re-analysis of 25 GE Lunar scans against the female database produced a highly consistent increase of 0.6 in the hip T-score and 0.3 in the spinal T-score. When these patients were classified as osteoporotic, osteopenic or normal, 8/25 men were re-classified at one site and 2/25 at both. For Hologic scans, re-analysis led to an increase in T-score of 0.4 at both hip and spine. Of these 25 patients, 6 patients were re-classified at one site and one at both. In total, re-analysis of these 50 scans led to an increase in T-score in all cases, and 17 (34%) were given a different “diagnosis” at one or both sites.

Discussion: The choice of reference range for the reporting of male DXA scans makes a very significant change to calculated T-scores and to the proportion of men labelled as osteoporotic or osteopenic. Local variation in this results in over-diagnosis of men with osteoporosis (as defined by WHO), and presumably also wide variation in clinical practice in the management of men with suspected osteoporosis. Using female reference databases for all, as is recommended, would also answer effectively the question of DXA reporting in transgender individuals.

Conclusion: UK authorities should seek to standardise DXA reporting in accordance with scientific reasoning and international guidelines.

Corinne Birch^{1,2}

¹University of the West of England

²NHS Primary Care, Pier Health, Weston-super-Mare, UK

DEVELOPMENT OF AN INNOVATIVE DIGITAL QUESTIONNAIRE TO SCREEN ADULTS FOR RISKS OF OSTEOPOROSIS AND FALLS IN PRIMARY CARE BY A FIRST CONTACT PHYSIOTHERAPIST

Background: Socio-economic costs of hip fractures are formidable. Despite osteoporosis and falls being major risk factors, routine screening in Primary Care does not occur. Evidence for reducing hip fractures through screening older women for osteoporosis is growing. However, to make an even greater impact on the incidence of future hip fractures, it makes clinical and economic sense to screen for both fracture and falls risks at the same time.

Objective: This study evaluates the accuracy of an innovative digital questionnaire and computer programme to collect person-reported data, combine it with medical data, to calculate fracture and falls risks without the need for clinician time.

Methods: This study is a cross-sectional quantitative evaluation of adults identified at (1) high and medium risk of osteoporosis and (2) high risk of falls, using a web-based questionnaire and bespoke computer programme. Adults aged ≥ 65 years who had consented to receive electronic correspondence were included. Excluded were adults in nursing/residential care or receiving palliative care. Questionnaires were distributed via email or SMS over a 16-week period. Patient-reported information was combined automatically with existing medical data required to complete the FRAX® & FRAT (falls-risk assessment) tools. A robot computer function auto-populated and retrieved fracture risk scores from the FRAX® online tool. A report was generated with those at high and medium risk of fracture and at high risk of falls.

Results: 632 (37%) of 1692 questionnaires were returned. Participant ages ranged from 65 to 92 years ($M=72.5$, $SD=5.7$), 47.8% identified as male and 52.2% female. Using NOGG UK Guidelines (2021), 217 (34%) adults were identified at amber and 46 (7%) at red fracture risk. 131 (20.7%) adults had fallen within the previous year and 122 (19%) had a high-risk FRAT score ≥ 3 . Personalised bone health and lifestyle advice was automatically delivered to all 632 adults.

Discussion: This automated screening process enables accurate identification of adults who are falling and/or at risk of osteoporosis and provides personalised bone health and lifestyle advice without the need for clinician time. Prevention of both falls and hip fractures should result in significant savings to the NHS and Social Care budget.

Sue Edwards¹, Katy Knight³, Claire Senior², Karen Knapp³

¹Diagnostic Imaging, Dorset County Hospital, Dorchester, UK

²Rheumatology, Dorset County Hospital, Dorchester, UK

³Faculty of Health and Life Sciences, University of Exeter, Exeter, UK

IMPROVING UNDERSTANDING OF PATIENT TREATMENT DURATION AND ADHERENCE USING A STRUCTURED PRO-FORMA DURING DUAL-X-RAY ABSORPTIOMETRY SCAN VISITS

Introduction: Patient adherence to bisphosphonates is reported to be variable. It is useful for the person reporting a DXA scan to understand the duration and adherence of treatment to enable a clinically useful report. However, insufficient information regarding treatment duration and adherence is common in DXA referrals. The aim of this service evaluation was to evaluate a treatment pro-forma for completion by the radiographer during DXA scan appointments.

Methods: A treatment pro-forma was developed to capture information on the type and duration of treatment. Other questions included adherence, how and when the patient takes their treatment, whether the patient takes calcium and vitamin D and the interval between bone medication and this. Additional questions regarding any dental problems and any symptoms of atypical femoral fracture were also included. A service evaluation of additional information gained using the treatment pro-forma was recorded over a period of 16 months. Data were summarised using descriptive statistics in R.

Results: The treatment pro-forma was used and included in the evaluation in 235 cases. The data are outlined in table 1. Table 1 shows the range of additional information gained from the treatment pro-forma. The treatment pro-forma provided important additional information to the referral in 62.6% of the patients included in the service evaluation.

Comment	Number (%)	Additional comments
Takes with food/drink other than water	7 (3.0)	
Changed to parenteral medication	2 (0.9)	
Taking with all other medication, Ca and Vit D	1 (0.4)	
Crushing tablets and taking in water	1(0.4)	
Included 2 years off Tx, not indicated in referral	1(0.4)	
No new treatment information gained	88 (37.4)	Problems with teeth / gums x 2 Groin pain x 2
On Treatment holiday	4 (1.7)	
Patient cannot remember how long	1 (0.4)	
Nausea / acid reflux	2 (0.9)	
Patient goes back to bed after AA	2 (0.9)	
Patient stopped taking	22 (9.4)	
Sometimes skips a week	2 (0.9)	
States duration of Treatment, which the referral did not	102 (43.4)	Dental issues x 3 Stopped due to side effects x 2 Hip, thigh or groin pain x 3

Conclusion: The use of a structured treatment pro-forma is an effective way to capture essential information for DXA reports, which is frequently missing from referrals. This improves equity for patients attending the DXA service because all patients are able to benefit from improved interpretation and reporting of their DXA scans. The pro-forma also enables point of care advice from the radiographer if treatment is being taken incorrectly.

Anchal Gupta, Tahir Masud

¹Department of Health of Older People, Nottingham University Hospitals NHS Trust, Nottingham, UK

A QUALITY IMPROVEMENT PROJECT ON PATIENTS' ATTITUDES TOWARDS TELEPHONE CONSULTATIONS IN AN OSTEOPOROSIS CLINIC

Background: The increasing use of telemedicine during the COVID-19 pandemic warrants ascertaining patients' views on this development. A quality improvement project was performed to understand patients' attitudes and improve telephone consultations in an osteoporosis clinic, and its post-pandemic relevance.

Methods: Ten participants were interviewed about their experiences of medical consultations in-person and over the phone with a consultation physician in the osteoporosis clinic using a qualitative methodology (grounded theory). Consent was sought over the phone within two weeks of the consultation. Semi-structured interviews were taken over the telephone, including open and closed questions. Open-ended questions allowed the participants the flexibility to talk about their experiences, while close-ended questions allowed the comparison of their experiences against a proforma. Data from the interviews were recorded, analysed and emerging themes noted.

Results: Several themes that arose from the study include accessibility, ease of building trust and consultation satisfaction. Feedback was generally rated high in each theme. All ten patients were highly satisfied with their appointments, regardless of the consultation mode. Patients traditionally prefer face-to-face appointments, but most are open to accepting virtual appointments and mention positive aspects of virtual consultations.

"I would recommend telephonic consultations, especially to those with mobility concerns or complex health issues" (Interviewee 5)

"... don't have to wait for telephonic appointments because Professor calls on time...waiting time when I am in the clinic can take up to 15 minutes" (Interviewee 3)

Seven of the ten patients felt there should be a mixture of face-to-face and virtual appointments and is highly dependent on the purpose of the consultation. Open-ended comments reflected that the preference of consultation mode was dependent on the patient's confidence in the clinician.

Conclusion: The results of this qualitative study showed that overall patients in the osteoporosis clinic have a positive attitude towards telephone consultations. While patients preferred face-to-face appointments slightly more than telephonic ones, they were happy to go with the recommendations from their consultant on the mode of consultation. Findings also reinforce the importance of having a good doctor-patient relationship in improving patient attitudes towards virtual consultations.

Kerrie Bethwaite¹, Zoe Paskins^{1,2}, Nicky Dale¹, Seeba Mathew¹, Ashley Hawarden^{1,2}

¹Midlands Metabolic Bone Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

²Haywood Academic Rheumatology Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

IMPLEMENTATION OF A VERTEBRAL FRACTURE PATHWAY TO IMPLEMENT ROMOSUZUMAB

Background: The Royal Osteoporosis Society (ROS) and National Osteoporosis Guideline Group (NOGG) consensus statement recommends prioritising Romosozumab in postmenopausal women with a history of major osteoporotic fracture within 24 months, bone-mineral density (BMD) defined osteoporosis and vertebral fracture.

Objective: To develop a rapid access vertebral fracture pathway to implement the NOGG/ROS advisory statement on Romosozumab prioritisation.

Methods: Post-menopausal women with a history of vertebral fracture are identified by the Fracture Liaison Service. Identified patients are invited for review in an advanced clinical practitioner rapid access vertebral fracture clinic. Clinic review includes a detailed history, bone density scan and relevant investigations. Patients are discussed in the vertebral fracture MDT and eligible treatment options determined. Patients subsequently attend a doctor-led vertebral fracture clinic to make an informed treatment decision.

Results: From January 2023-March 2023 a total of 63 patients were invited to the rapid access vertebral fracture clinic. 13 patients did not attend (DNA). 50 patients were subsequently discussed in the vertebral fracture MDT. 31 patients were ineligible for Romosozumab (T-score >-2.5 (20), grade 1 vertebral fracture only (2), cardiovascular disease (2), cerebrovascular disease (3), high trauma vertebral fracture (2), old vertebral fracture (1) and unavailable BMD (1)). Treatment was indicated in 26 of these patients and they were referred for zoledronate (19), alendronate (2), ibandronate (1), denosumab (1) and additional review in metabolic bone clinic (3). 19 patients were considered for Romosozumab and 13 patients have been referred to the doctor-led vertebral fracture clinic for treatment. 1 patient has commenced treatment, 2 patients declined treatment and 10 await review. Remaining patients were offered Teriparatide (2, cardiovascular risk), Zoledronate (4, cardiovascular risk).

Discussion: The vertebral fracture pathway has improved rapid access to Romosozumab. 62% of patients discussed in MDT were not eligible for Romosozumab. However, the pathway was still beneficial as it resulted in fast-tracking to alternative treatment strategies. Unfortunately, DNA rate was high (21%).

Conclusion: In our single-centre experience a fast-track vertebral fracture pathway is effective in aiding the prioritisation of Romosozumab. However, to operate effectively, it requires dedicated staff and protected clinic time.

Qizhi Huang¹, Caroline Mitchell¹, Janet Brown²

¹Academic Unit of Primary Medical Care, University of Sheffield, Sheffield, UK

²Department of Oncology and metabolism, University of Sheffield, Sheffield, UK

ASSESSMENT AND MANAGEMENT OF FRACTURE RISK IN MEN WITH PROSTATE CANCER TAKING ANDROGEN DEPRIVATION THERAPY: A RETROSPECTIVE OBSERVATIONAL PRIMARY CARE DATABASE STUDY

Background: Osteoporosis is often underdiagnosed and undertreated in men. Prostate Cancer (PCa) is the commonest cancer in the UK with 1 in 8 affected in their lifetime. Androgen deprivation therapy (ADT) is a mainstay of treatment for PCa, and is a secondary cause for osteoporosis. NICE and NOGG guidelines recommend patients with PCa on ADT receive a fracture risk assessment.

Objectives: This retrospective multi-practice database study aimed to evaluate how fracture risk of patients with PCa on ADT was assessed and managed in primary care.

Methods: Registered patients with PCa were identified, using SNOMED codes, from five sociodemographically diverse practices (registered population 43,500). Data were extracted from records including hospital letters and included: demographics; ADT duration; a 10-year fragility fracture score (FRAX); NOGG intervention threshold; DEXA requests; use of bone protective agents (BPA). FRAX scores were compared using the t-test.

Results: 261 PCa patients: 6% black African/Caribbean, 89% white British; average age 75 years (range 50-93), 13% had metastatic PCa. Half of the patients had been prescribed ADT, 28% being current users. Average ADT duration was 41 months (3 months – 19 years). No fracture risk assessment was documented for any patients. ADT current users had significantly increased FRAX scores for both major osteoporotic fractures (MOF): $9.61\% \pm 1.12\%$ (mean \pm 95%CI), and hip fracture (HF): $5.30\% \pm 1.02\%$ compared with PCa patients without ADT: $7.08\% \pm 0.57\%$ (MOF) and $3.06\% \pm 0.46\%$ (HF) respectively, $p < 0.001$; RR were 1.36 and 1.73 for MOF and HF respectively. One patient had a high risk of osteoporosis (NOGG red) requiring BPA treatment; 55 patients (21%) showed moderate risk (NOGG amber), warranting a DEXA scan. Pre-existing osteoporosis/osteopenia was recorded in 13 (5%) patients, with 16 new cases post diagnosis. Overall 17 patients (6%) received BPA. Patients in more affluent areas tended to receive more DEXA scans and treatment.

Discussion: Men with PCa, on ADT have increased risks of osteoporosis, but they are under-diagnosis and under-treatment, especially in more deprived areas.

Conclusion: There is an unmet need to proactively manage the fracture prevention of men with PCa taking ADT.

Martina Cooney¹, Lorraine O'Neill²

¹Rheumatology Dept, Our Lady's Hospice & Care Services, Dublin, Ireland

²Rheumatology Dept, St Vincent's University Hospital, Dublin, Ireland

EVALUATION OF A NURSE-LED BONE HEALTH PATIENT EDUCATION WORKSHOP

A nurse-led patient education workshop was conducted to evaluate its effectiveness on patient satisfaction and adherence to therapy among patients with rheumatic disease at risk of osteopenia/osteoporosis. The one-hour weekly sessions aimed to increase awareness about bone health and covered topics such as osteoporosis, osteopenia, bone remodeling cycle, calcium and vitamin D, diagnosis, DXA scanning, medication, self-management, exercise, safety in the home, and falls prevention. Patients were given two questionnaires to complete; the first after the session and the second during a follow-up phone call after three months. 60 patients attended the workshop, with 73% female and 27% male. 38% of participants had osteopenia/osteoporosis, and 48% had a prior fragility fracture. 46% of patients consented to a follow-up phone call, and data was available for 18 of them who were on treatment for bone health at the time of the initial workshop. At follow-up, 17/18 were adherent to treatment, and all respondents reported that their increased knowledge and awareness since the workshop had improved their adherence to treatment. One patient had stopped taking calcium and vitamin D as she had sufficient dietary intake. The service evaluation demonstrated that nurse-led bone health education sessions effectively increased patients' awareness and adherence to therapy, and no patient phoned had sustained a further fracture. Feedback from patients was positive, and all participants found the workshop to be helpful and informative. Only one recommendation was made for future sessions, which was to emphasize the importance of vitamin D more.

In conclusion, nurse-led bone health education sessions can significantly improve patients' adherence to and continuation of bone health medications

Laurina Bullock¹, Ashley Hawarden^{1,2}, Kerrie Bethwaite², Nicky Dale², Ian C Scott^{1,2}, Zoe Paskins^{1,2}

¹School of Medicine, Keele University, Staffordshire, UK

²Haywood Academic Rheumatology Centre, Staffordshire and Stoke-on-Trent Partnership Trust, Stoke-on-Trent, UK

ASSOCIATION OF BONE MINERAL DENSITY-DEFINED DIAGNOSIS OF OSTEOPOROSIS WITH LIKELIHOOD OF TAKING OSTEOPOROSIS DRUG TREATMENTS IN A SINGLE FRACTURE LIAISON SERVICE

Background: Osteoporosis is operationally defined using Bone Mineral Density (BMD), measured using dual energy x-ray absorptiometry (DXA) with a T-score of -2.5 or less. Given that osteoporosis drug treatment is determined by fracture risk rather than BMD, large numbers of people without BMD-defined osteoporosis, are recommended “osteoporosis” treatment.

Objective: To investigate the hypothesis that a BMD-defined diagnosis of osteoporosis might influence patient osteoporosis treatment decision-making, we conducted a service evaluation to examine the association between BMD-defined osteoporosis diagnosis and osteoporosis treatment uptake at 3 and 12 months, using our centre’s routinely collected Fracture Liaison Service (FLS-DB) national audit data.

Method: Data from FLS-DB were exported for the period 01.01.2019 to 01.01.2022. We established patient records who had received DXA, with a BMD-defined osteoporosis (T-score ≤ -2.5), or not (exposure), and 3 and/or 12-month follow-up about use of recommended osteoporosis treatment (outcome). Frequencies and percentages summarised the proportion of osteoporosis treatment users at 3 and 12 months. Univariate and multivariable binary logistic regression models tested the association between BMD-defined osteoporosis (yes/no) and osteoporosis treatment use (taking/not taking) at 3 and 12 months.

Results: 1,318 records were included, with 44.4% (n=585) not meeting the BMD definition of osteoporosis (see Table 1).

Table 1. Association between BMD-defined osteoporosis and drug treatment use at 3 and 12 months

	BMD-defined osteoporosis (n=733)	No BMD-defined osteoporosis (n=585)	Crude OR (95% CI)	Adjusted OR* (95% CI)
Female n (%)	597 (81)	464 (79)	-	-
Age mean (95% CI)	68 (68 – 69)	69 (68 – 70)	-	-
3-month follow-up n (%)	712 (97)	562 (96)	-	-
Taking treatment n (%)	386 (54)	305 (52)	1 (0.80,1.25)	1 (0.82,1.29)
Not taking treatment n (%)	326 (46)	257 (46)	Reference	Reference
Patient decline** n (%)	25 (8)	36 (14)	-	-
Not started n (%)	294 (90)	214 (83)	-	-
No longer appropriate*** n (%)	7 (2)	7 (3)	-	-
12-month follow-up n (%)	629 (85)	469 (79)	-	-
Taking treatment n (%)	464 (73)	343 (73)	0.97 (0.74,1.27)	0.99 (0.76,1.30)
Not taking treatment n (%)	165 (26)	126 (27)	Reference	Reference
Patient decline n (%)	41 (25)	32 (25)	-	-
Not started n (%)	111 (67)	81 (64)	-	-
No longer appropriate n (%)	13 (8)	13 (10)	-	-

*Adjusted for age and gender

** Includes audit outcomes ‘patient declined’ and ‘informed patient declined’

***Includes audit outcomes ‘no longer appropriate’ and ‘no longer clinically appropriate’

CI confidence intervals, BMD Bone Mineral Density, OR odds ratio

Discussion: Outcome categories potentially overlap, are subject to reporter bias, and, furthermore labels and definitions including ‘no longer appropriate’ and ‘patient decline’ have changed over the course of the audit, limiting interpretation.

Conclusion: This data suggests there is no association between BMD-defined osteoporosis and likelihood of taking treatment, although proportionately more patients with a T-score >-2.5 declined treatment at 3 months. Results contrast previous research suggesting BMD-defined osteoporosis diagnosis facilitates treatment decision-making and uptake. Further investigation is needed in larger datasets.

Conflicting Interests: ZP is funded by the National Institute for Health and Care Research (NIHR), Clinician Scientist Award (CS-2018-18-ST2-010)/NIHR Academy. ICS is funded by the NIHR (Advanced Research Fellowship, NIHR300826). AH is funded by a Versus Arthritis Clinical Research Fellowship (ref: 22726). The views expressed are those of the author(s) and not necessarily those of the NIHR, NHS or the Department of Health and Social Care.

Jill Griffin¹, Shuna Mighton², Adele Heasty³

¹The Royal Osteoporosis Society, Bath, UK

²Radiology, NHS Western Isles, Stornoway, UK

³South West Acute Hospital, NI, UK

UK MULTI CENTRE DXA REPORTING AUDIT- EFFECTIVENESS OF TRAINING ON ATTAINING STANDARDS

Background: Clinical evaluation (reporting) of DXA scans is mandated under the ionising radiation (medical exposure) regulations 2017, and subject to standards of the Royal College of Radiologists. Supporting the provision of quality DXA and enabling fracture liaison services to meet KPIs for DXA though national audit, the Royal Osteoporosis Society (ROS) published standards for reporting of DXA scans in 2019.

Methods: This audit evaluated pre training DXA reporting practices across 2 UK NHS DXA services, for compliance to the ROS reporting standards and included 100 reports authored by 2 reporters. The results were compared to a re-audit following accredited DXA reporting training. The audit interrogated standards through one or more questions resulting in further granularity of response for future evaluation.

Discussion: The baseline audit demonstrated variability across the reporting standards. The common areas of non-compliance were around specialist DXA reporting training, local protocols, quality assurance and clinical governance. Following accredited training every standard was achieved except for imaging referral following identification of grade 1 vertebral fractures on vertebral fracture assessment (VFA), where there is limited data, this does however suggest an improvement of 33%. While this audit is limited to 2 participating centres it demonstrates impact on quality for those served by these services and as proof of concept is applicable to other centres.

Conclusion: Accredited DXA reporting training is important for quality improvements in DXA reporting services and compliance with regulatory and clinical standards.

Standard	Compliance pre training	Compliance post training
1- Report issued within 3 weeks	82%	100%
2- Training and IR(ME)R entitlement	50%	100%
3- Quality assurance and clinical governance	50%	100%
4- Local reporting protocol	50%	100%
5- Imaging referral for grade 1 fractures identified by VFA	0%	33%
6- Management advice and access to support	100%	100%

Jabez Gnany¹, Reuben Johnson¹, Dula Alićehajić-Bečić¹, Nuthan Jagadeesh²

¹Trauma and Orthopaedics, Wrightington Wigan and Leigh NHS Foundation Trust, Wigan, UK

²Consultant Clinical Pharmacist, Wrightington Wigan and Leigh NHS Foundation Trust, Wigan, UK

OSTEOPOROSIS VERTEBRAL FRACTURES – ASSESSMENT AND INTERVENTION USING FRAX TOOL

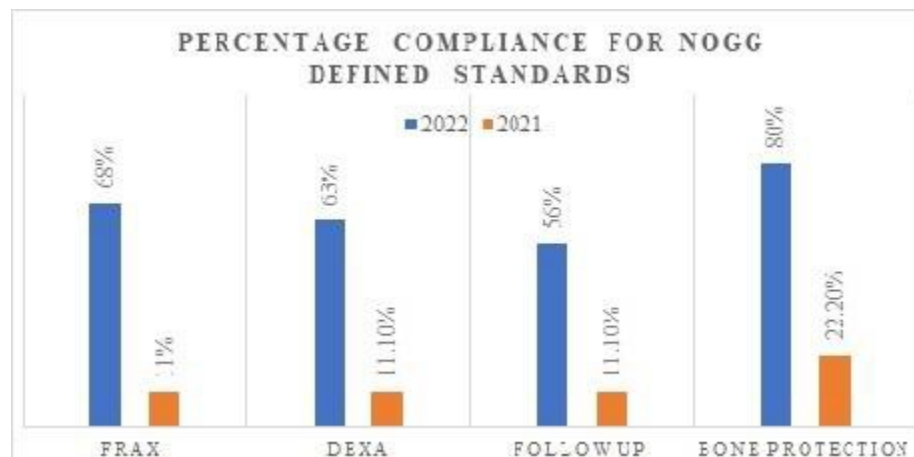
Introduction: Osteoporosis is the most prevalent systemic skeletal disorder affecting the bone structure leading to increased risk of bone fractures and disability among the population. Osteoporosis is characterized by low bone mineral density. Over 500,000 patients with fragility fractures present to UK hospitals each year. Previously a pathway was established to assess the asymptomatic fractures and a referral pathway to fracture liaison services were created locally. We are looking to improve efficiency of the pathway since the time it was implemented. Since inception of Frailty Bone Health clinic in August 2020, new pathway agreed for specialist clinic follow up (>65 years to frailty bone health clinic, <65 years/or already under care of rheumatology clinic).

Aims: To improve completion rate of NOGG defined standards for patients presenting with vertebral fractures under orthopaedic care.

Materials and Methods: Cohort of patients were assessed for osteoporotic risk fractures in line with standard NOGG. Design features: Systematic study in cohort of patients admitted under Orthopaedic care. Data sources: Patient record on HIS note and spinal patient pass system Sample: 47 patients, between April 2022 to September 2022 Age Mean 82.17, Male: Female 8:39 Data protection and confidentiality- Confidentiality maintained. Ethical and legal issues - None

Results: 29 out of 47 (61%) individuals in the cohort have had previous fractures, which increases the risk of subsequent osteoporotic fractures

Conclusions and Discussion: We had established a referral pathway (>65 years to elderly care clinic, <65 years to rheumatology clinic) and educated junior doctors to make the referrals as appropriate, included FRAX calculation as part of training and induction. On implementation of FRAX tool on HIS has been user friendly. We have seen significant improvements in the documentation using FRAX tool and increased number of referrals to specialist care. Although we are short at some figures, the change is evident.



Jill Griffin¹, Nikos Methenitis¹, Nicola Peel², Karen Knapp³

¹The Royal Osteoporosis Society, Bath, UK

²Sheffield Teaching Hospital, Sheffield, UK

³University of Exeter, Exeter, UK

INADEQUACIES IN DXA AND REPORTING TRAINING: A UK WIDE AUDIT

Background: Bone mineral density (BMD) measurements using DXA are used to diagnose osteoporosis in adults, are an important component of fracture risk assessment, and are routinely used to inform patient management and treatment decisions. Optimal management outcomes are contingent on the delivery of high-quality scan technique and reporting. Specialist training for DXA scan acquisition, analysis and reporting are not included in any healthcare professional training programme but may be accessed as postgraduate training.

Methods: An audit of DXA services was undertaken via a freedom of information request to 160 UK NHS hospital trusts and health boards, with the aim of evaluating the factors that influence the quality of DXA service outputs. Questions were included to evaluate the training of those performing and reporting DXA scans.

Results: 133 centres (83.5%) responded to the audit, 10 centres did not provide a DXA service and 13 outsourced DXA to external providers. Of the 110 NHS services providing results, 90% (n.99) reported that DXA operators received 'in house' training and 76% (n.84) had operators who had received additional accredited training. The Royal Osteoporosis Society charity was cited as delivering accredited operator training in 75%. Most centres reported that DXA scans are reported by radiographers and/or medical practitioners (59 centres [54%], 70 centres [64%] respectively). Only 32% (n.35) of centres have reporters who have undertaken accredited DXA reporting training.

Discussion: This UK-wide evaluation has identified that in a high proportion of NHS DXA services, scans are undertaken by operators who have completed accredited training. It is notable that the majority of this training is delivered by a charity reflecting a lack of alternative accredited training. Alarming, DXA scan reporting is provided in only a minority of NHS centres by healthcare professionals who have undertaken accredited training.

This audit highlights the limited availability of accredited training to report DXA scans. Our findings raise concern that clinical decisions about patient management may be frequently adversely affected by use of technically unreliable BMD measurements and poorly informed clinical interpretation. Provision of accredited DXA training and particularly for reporting is inadequate in the UK to support quality management outcomes.

Final Poster Number: P22

Laura Henderson, Carolyn Tipton

¹Medicine for the Elderly, NHS Tayside, Dundee, UK

VERTEBRAL FRACTURE REPORTING AND DIAGNOSIS OF OSTEOPOROSIS PRIOR TO HIP FRACTURE - A MISSED OPPORTUNITY?

Background: Vertebral fractures resulting from low trauma injury are indicative of osteoporosis, and if severe warrant referral to a specialist bone service. Vertebral fracture may be seen incidentally on imaging that includes the spine. The Royal College of Radiologists have produced guidance on reporting to simplify terminology used. However even when commented upon, the significance of vertebral fractures may be missed by the referring clinician.

Methods: A retrospective audit of electronic medical records was performed for patients admitted with hip fracture. Community health record was reviewed for diagnosis of osteoporosis or vertebral fracture. Radiology reports from the preceding decade were reviewed for mention of vertebral fracture. Vertebral "wedging", "compression", "loss of [reduction in] height" and "collapse" were accepted.

Results: 151 patients presenting over a 10 week period were included. 51 were excluded due to lack of access to electronic records or pathological fracture. 17/100 had a prior diagnosis of osteoporosis. Of the 83 not recorded as having osteoporosis, 52 had previous spinal imaging, with 11/52 (21%) reporting vertebral fractures. The terminology used varied, though 4/11 used the word "osteoporotic" or "osteoporosis" and 6/11 used "fractures" or "fracture".

Conclusion: A significant number of patients not known to have osteoporosis had prior imaging reporting vertebral fracture. This suggests the diagnosis of vertebral fragility fracture was not made, and an opportunity to reduce the risk of future fragility fracture was therefore missed. This audit prompted discussion with the local radiology department, highlighting the need for standardised reporting when describing vertebral fragility fractures and advising referral to the local specialist bone service (if clinically appropriate).

Final Poster Number: P23

Naman Arora¹, Shree Muthukrishnan¹, Yuen Kang Tham¹, Bhagya Arun¹, Kavan Arora¹, Linda Scaloni¹, Johanna Wiles², Sophie Maggs¹, Amara Williams¹, Deb Collier³, Peter Carr⁴, Tracy Morgan³, Ketan Vegad¹, Non Pugh², Inderpal Singh¹

¹Geriatric Medicine, Aneurin Bevan University Health Board, Caerphilly, UK

²Rheumatology, Aneurin Bevan University Health Board, Newport, UK

³Medical Directorate, Aneurin Bevan University Health Board, Gwent, UK

⁴Executive Board, Aneurin Bevan University Health Board, Gwent, UK

QUALITY IMPROVEMENT INITIATIVES TO IDENTIFY AND MANAGE FRAGILITY FRACTURES IN A WELSH HEALTH BOARD

Background: Fracture liaison services (FLS) aim to prevent secondary fractures by ensuring high-quality care to all patients with fragility fractures above 50 years. Only 22.7% (n=879) patients were identified by the FLS team in 2021 (National average=40%).

Objective: To improve the identification and patient care with fragility fractures

Methods: A quality improvement methodology based on the model of improvement; Plan-Do-Study-Act cycles were used. Process mapping for the existing FLS service was completed. Ownership by the Medical Division and cross-divisional engagement through Clinical Leads: Rheumatology, Care of the Elderly (COTE), and Radiology were established. Falls and Bone Health Committee was set up at the executive level to drive the agenda for change. Partnership working with the Royal Osteoporosis Society (ROS) facilitated the FLS economic benefit calculations. FLS Database (FLS-DB) was used to review the improvement on a monthly basis.

Results: Process mapping supported the establishment of the two FLS-DB pathways: Rheumatology team to provide care for patients under 75 with the current Clinical Nurse Specialist (CNS) and COTE team to assess patients above 75 years. Medical Division funded two CNS for 12 months. Collaboration with the Radiology assisted to generate separate weekly fracture data for the rheumatology and COTE teams. FLS-DB identified 42.6% (n=1651) patients in the year 2022, an 88% increase as compared to the year 2021. A major improvement was observed in comparison to the previous year and also against the national benchmark: Spine fracture improved from 26% to 35% (National average=21%); Falls assessment improved from 35% to 81% (National average=61%) and Bone treatment improved from 58% to 66% (National average=54%)

Discussion: Collaboration with the ROS pursued Health Board's focus on the strategic planning for the FLS. Initial results of the pilot have supported the further extension of the pilot for another year with the aim of improving annual follow-up by engaging with the Primary Care. This pilot also highlights the importance of improving culture and multi-professional awareness of FLS.

Conclusion: The wider partnership working with ROS promoted cross-divisional engagement and gained stakeholder awareness of the FLS for our Health Board. This quality initiative has streamlined our rheumatology and COTE services which need further evaluation using Value-Based healthcare.

Rachel Brown¹, Amber Williams¹, Jon Tobias^{1,2}, Emma Clark^{1,2}

¹Rheumatology Department, North Bristol NHS Trust, Bristol, UK

²Bristol Medical School, University of Bristol, Bristol, UK

SERVICE EVALUATION: PATIENT EXPERIENCE OF DXA SCANNING IN A LARGE DISTRICT GENERAL HOSPITAL

Background: It is important to obtain feedback from patients to assess their overall satisfaction levels with any healthcare service and ensure that quality care is being provided. Previous studies have shown a link between negative experiences within a treatment setting and poorer levels of compliance in their treatment regime. Our aim was to assess patients' views on the (1) appointment information about getting to the DXA appointment and information on the process of the scan; (2) patient care during and after the DXA scan appointment has taken place, including information given regarding results; and (3) to listen to patient feedback regarding ideas for service improvement.

Methods: Over a 2 month period, every patient attending every DXA clinic was asked to participate by completing a feedback questionnaire after their scan appointment. The survey was offered to all patients that came in for a DXA scan and no further exclusion criteria was required. It was noted that patients that may be unable to complete the survey for reasons such as illiteracy, could have the survey completed on their behalf, for example by a carer. Surveys could also be returned to the department by post if the patient wished to complete it at home and a QR code was also available to those that wanted to complete this digitally. The survey comprised of 13 questions. 11 questions were yes/no answers and the remaining 2 questions were open/free text questions.

Results: The survey was offered to approximately 180 patients, and 25 were completed and returned. Satisfaction with appointment information and information on the process of the DXA scan were high. Satisfaction with patient care during and after the scan was also high. A number of comments were made about the delay between having the scan and receiving the results (currently 4 weeks). Ideas for service improvement were mainly around reducing the length of the clinical questionnaire we require patients to complete before their DXA scan.

Conclusion: Generally patients were satisfied, although our response rate was low. Areas for improvement include more timely results, and reducing the length of the clinical questionnaire.

Jill Griffin¹, Nikos Methenitis¹, Nicola Peel², Karen Knapp³

¹The Royal Osteoporosis Society, Bath, UK

²Sheffield Teaching Hospital, Sheffield, UK

³University of Exeter, Exeter, UK

UK-WIDE DXA REPORTING QUALITY BENCHMARK AUDIT

Background: DXA Bone mineral density (BMD) measurements are used to diagnose osteoporosis, refine fracture risk assessment, and inform patient management. Quality clinical evaluation (reporting) is mandated by Ionising Radiation (Medical Exposure) Regulations 2017 (IR(ME)R), and optimal management outcomes are reliant on high-quality scans, interpretation, and reporting.

Methods: An audit of DXA services was undertaken via a freedom of information request to 160 UK NHS hospital trusts and health boards, which aimed to benchmark factors affecting the quality of DXA reporting against selected standards published by the Royal Osteoporosis Society in 2019.

Results: 133 centres (83.5%) responded, 10 centres had no DXA service and 13 outsourced DXA to external providers. Of the 110 NHS services providing results: 69% (n.76) of centres typically issue reports within 3 weeks of the scan, 86% (n.95) of centres have non-medical clinicians reporting DXA scans, of which 86% (n.82) are registered health professionals. Only 32% (n.35) of *all* reporters (medical and non-medical) have received accredited reporting training. 81% (n.89) of centres reports include commentary on the technical reliability of measurements, but only 65% make any statement regarding the clinical significance of changes in BMD in follow up scans. Assessment of absolute fracture risk is routinely included at just 53% (n.58) of centres, and only 52% (n.57) include individualised management advice.

Discussion: This audit highlights the variability in registration of those reporting DXA scans, which includes some non-registered reporters, and a lack of accredited training to support quality reporting and optimal management outcomes. Almost a third of reports are delayed beyond the time set out in the standards which may result in treatment delays.

There are important gaps in quality elements of report content and only half of all reports contain individualised management advice. This is of concern and demonstrates a lack of clinical support for referrers when making management decisions. Additionally, IR(ME)R requires *optimisation* of DXA scans to facilitate meaningful outcomes and this is missing in these cases. We recommend that centres should routinely undertake audit of clinical reporting to inform quality improvements in practice so that patients can receive individualised management informed by optimised DXA reporting.

Hajara Abdul Rahman, **Marwa Mohareb**, Teuny Jones, Anupama Nandagudi
Rheumatology, Mid and south Essex, Basildon, UK

REVIEW OF THE DENOSUMAB PATHWAY BETWEEN THE SECONDARY CARE AND INTERMEDIATE CARE

Background: Denosumab is recommended for osteoporosis by NICE guidelines. Since 2018, patients were referred to Connect Health (intermediate care) following the first denosumab injection at Basildon Hospital (secondary care). These patients were then reviewed at secondary care in the event of any complication or following five injections.

Objectives: To review the denosumab pathway between intermediate and secondary care and identify any dropouts or adverse events.

Methods: The clinical records of patients treated with denosumab were reviewed between 2018-2021. Demographics, osteoporosis, treatment, injections at intermediate and secondary care and subsequent reviews at hospital was noted.

Results: Eighty-seven patients were reviewed with age range between 61-100 years (Median 79 years). Females were 92%, 71% had osteoporosis and 72% were primary osteoporosis. Mean T score at L spine was -2.3(-0.1 to -4.5), hip -1.7(0.3 to -3.7) and neck of femur -2.1 (0.3 to -3.7). Bisphosphonate was the first line of treatment in 98%. Denosumab was commenced after long-term course of bisphosphonate in 63%, following bisphosphonate intolerance in 21% and following fracture on bisphosphonate in 7%.

Number of injections in secondary care ranged from 1-11 injections (median 2 injections), while at intermediate service ranged from 0-6 injections (median 4 injections).

Discussion: Patients receiving denosumab 5-9 injections was 55%, 10-14 injections were 11%, >15 injections were 2% and waiting 5th injection was 31%. Eighty-eight percent were reviewed after 5th injection and 50% were reviewed after 10th injection. Six patients were not reviewed after 5th injection of which 50% were waiting for review and 50% died. Six patients were not reviewed after 10th injection of which 50% were waiting for review, 17% had drug holiday and 33% died. Zoledronate was commenced in 3 patients following new fracture (2) and adverse effect (1). Out of the 9 deaths, 5 patients died before 5th injection.

Conclusion: The project showed that the pathway worked well with no dropouts between secondary and intermediate care. There were 2 new fractures and one adverse effect observed where treatment was switched to zoledronate. It stresses on effective communication between intermediate and secondary care.

A Sinha¹, BK Sangha¹, M Buensalido², S Criseno², Z Hassan-Smith²

¹Birmingham Medical School, College of Medical and Dental Sciences, University of Birmingham, Birmingham, UK

²Department of Endocrinology, Queen Elizabeth Hospital Birmingham, Centre for Endocrinology, Diabetes and Metabolism, Birmingham, UK

EXPERIENCE OF THE ADMINISTRATION OF FIRST DOSE IV ZOLEDRONATE AT QUEEN ELIZABETH HOSPITAL

Background: Osteoporosis affects almost 3 million people in the UK. Bisphosphonates form the mainstay of treatment. Common side effects are well-documented. Also, there is a lack of research specifically for zoledronate prescribing compared to oral bisphosphonates.

Objective: Our aims were to carry out an audit of whether zoledronate was being prescribed correctly according to guidance. A secondary analysis was conducted; assessing the proportion of patients who experienced side effects, along with onset and duration of symptoms. This was done to compare a specific selected group of patients to results published by NOGG-UK1.

Method: We retrospectively evaluated a local database of those on osteoporosis treatment. Records of 68 patients receiving their first dose of zoledronic acid at Queen Elizabeth Hospital (Birmingham), between January- December 2021 were identified. After reviewing patient records, we analysed proportion with completed FRAX assessment, indication for prescribing zoledronate, pre-infusion checks and symptoms reported by patients.

Results: 13 males; 55 females, age range (28-92 years). Most had pre-infusion checks, but only 93% had vitamin D checked. 96% (65/68) commenced on the drug for an appropriate indication, 16% had a FRAX score calculated while a DEXA scan was done for all patients. However, one patient was given the infusion despite having an eGFR < 35.

Majority of the patients (63%) did not experience any side effects following administration. 37% (25/68) reported some infusion-related symptoms, mainly bone/joint pain which lasted 1-2 days.

Discussion: Our audit has shown that zoledronate is being prescribed in concordance with guidance at QEHB. The treatment is offered after systematic checks of biochemical parameters (eGFR, serum calcium, vitamin D levels). Side effects reported are covered in patient information leaflets. It is noted South Asian women reported common symptoms more often. Further research is needed to ascertain predictors for subsequent adverse effects following infusion.

Conclusion: Overall the majority are given zoledronate for indications in line with national and local guidelines. Side effects were similar to what is known in literature. Improvements can be made regarding assessment of fracture risk. There is a future re-audit planned.

Rochelle Burgess, Marwa Mohareb, **Anurag Bharadwaj**, Anupama Nandagudi
¹Rheumatology department, Mid and south Essex, Basildon, UK

REVIEWING THE RISK ASSOCIATED WITH LONG TERM ORAL CORTICOSTEROID THERAPY IN RHEUMATOLOGY

Background: Patients with long term corticosteroids should be routinely screened for complications.

Objectives: To evaluate the adherence to NICE guidelines.

Methods: Notes were reviewed for patients seen between 2017 and 2021 with a diagnosis of Polymyalgia rheumatica (PMR) and /or Giant Cell Arteritis (GCA). Information about blood pressure (BP), body mass index (BMI), Bone health, eye health, triglycerides, HbA1c were reviewed at baseline and at 1 year.

Results: Fifty patients were enrolled with age range between 65-91 years (Median 77years). Females were 62%, 50% of patients had PMR, 44% GCA and 6% both. Fifty percent had comorbidities influenced with steroids, with hypertension in 26%, hypercholesterolemia in 6 % and diabetes in 20%. Steroid dose at 1 year was less than 5 mg in 46% of patients, 5-10 mg in 44% of patients and >15 mg in 10% of patients.

Fourteen percent of the patients received ophthalmology review as their vision was affected by GCA. Forty percent had FRAX assessment and 100% received prophylaxis. Patients were prescribed Vitamin D and calcium with normal FRAX assessment. Sixty percent did not have a FRAX assessment and 10% of those were not prescribed any treatment. Overall, 88% of all patients were on some form of osteoporotic treatment.

Discussion: It is important for rheumatology clinics to have specific protocols in place for monitoring patients receiving steroids to ensure early detection of any side effects to manage appropriately. There are no clear monitoring recommendations guidelines regarding eye health and Addison's disease

Conclusion: This study highlights lack of routine monitoring of all side effects, specific to steroid treatment in rheumatology clinics as per NICE guidelines.

Table: The parameter recorded at baseline and at 1 year, abnormal recording(s) with action taken

Parameter	Baseline	At 1 year	Action taken
BP	42%	0%	Those with hypertension (9 patients) only 2 were advised to contact the GP.
Triglycerides	48%	20%	Seven patients with hypertriglyceridemia. No action was taken.
HbA1c	48%	38%	Twelve patients had readings at both baseline and at year 1. Seven patients had an increase in levels at year 1 compared to baseline and 1 was referred to the diabetic nurse.
BMI	46%	6%	21 patients had high BMI and 1 was given lifestyle advice.

Final Poster Number: P29

Jack Boylan, **Jane Turton**, Zoe Hicks, Harrison Rowley, Michael Stone

¹Bone Research Unit, Cardiff and Vale UHB, Cardiff, UK

BENEFITS OF DENOSUMAB SELF-ADMINISTRATION

Background: Denosumab is a monoclonal antibody that binds to the RANK Ligand. It is administered twice a year by subcutaneous injection. Patients usually require treatment over a number of years. Historically in CAVUHB, over 3 years the usual care for patients on denosumab has involved 3 Dual X-ray Absorptiometry (DXA) scans, 3 visits to our consultant clinic and 6 visits to our treatment clinic. We offered patients the opportunity to self-administer denosumab at home on a 3-year Self-Injection Programme (SIP) reducing the visits to 1 DXA, 1 consultant visit and 1 treatment clinic visit. All patients in the SIP have regular remote contact with a specialist nurse.

Methods: The costs associated with the treatment of the first 69 patients enrolled in the SIP who had completed 3 years of self-administration were compared with 497 patients attending the out-patient treatment clinic during the same time period. Health board 2019/2020 patient level costs were used for each of the attendances.

Results and Discussion: The first 69 patients had on average 0.9 consultant visits (controls 2.3), 0.8 DXA visits (controls 1.6) and 2.2 treatment clinic visits, which includes the training visit (controls 5.2). Our costs per patient per year for patients on SIP are £207 (controls £623); this includes the VAT saving of £36 per dose of denosumab dispensed in the community. At 31st December 2022, 329 patients were participating in SIP. Based on attendances only, the total cost of running the service is £68,082 (normal care 329 x 623 = £309,631). Overall this represents annual cost savings of £241,549.

Being mindful of the environmental costs of hospital attendance we calculated that the reduction in the need for hospital visits saved 59kg CO₂ per patient per year. Informal patient feedback about the programme has been very positive.

Conclusion: CAVUHB has the challenge of maintaining high quality health care whilst reducing costs and supporting sustainability. The SIP has demonstrated that it is possible to achieve these objectives.

Conflicting Interests: I have received a speaker fee from AMGEN.

Arjun Raj¹, Preethu Anand¹, Yeshwanth Kempanna¹, Lakshmish Devang Halepalya Somashekar¹, Veena Patel¹, Saima Malik², Ramiya Al-alousi³, James Francis¹

¹Rheumatology, University hospital of Leicester, Leicester, UK

²Gynaecology, University hospital of Leicester, Leicester, UK

³Grobby Road Medical Centre

BONE HEALTH ASSESSMENT AMONG WOMEN WITH PREMATURE OVARIAN INSUFFICIENCY

Background: Osteoporosis is a common condition characterized by low bone mass and structural deterioration, leading to increased fragility and risk of fractures. Women with premature ovarian insufficiency (POI) are at increased risk of osteoporosis and thus increased incidence of fragility fractures. The aim of this audit was to evaluate the bone health of women with POI and compare our practice against NICE guidelines.

Methods: A retrospective study reviewed bone health assessments among patients with early menopause patients in the gynaecology department. General practitioner and DEXA referral records identified 36 patients from 2019 to 2021. Data was gathered by a questionnaire on age, ethnicity, fragility fractures, age of diagnosis of premature menopause, smoking, alcohol, co-morbidities, medication and the advice offered to them on bone health.

Results: From the 36 patients identified, vitamin D levels were checked in only 21 patients. 28 patients underwent DEXA scans in which the Fracture Risk Assessment Tool (FRAX) showed that 16 were at high or very high risk of developing fractures and the remaining 12 were low risk. 14 had a previous history of fractures out of which only 11 had undergone DEXA scans. Of the 20 patients suitable for treatment, 7 received vitamin D, 7 received Alendronic acid, 4 received calcium supplements and a majority of patients reported doing regular exercise. Only 7 out of the total 36 patients reported to have received bone health advice.

Conclusion: This audit highlighted the non-compliance of bone health assessment among women with POI, who are at increased risk of osteoporosis and fractures both in primary and secondary care among our cohort. This has led to new pathway between the gynaecology department and rheumatology to improve the overall osteoporosis care. Strategies like patient information leaflets, healthcare professional education session and dissemination of information in the patient waiting review was undertaken to enhance the bone health advice. Further re-audit would be needed to assess the improvement in the bone health assessment.

Thomas Oldfield, Jordan Altimimi

¹Warwick Medical School, University of Warwick, Coventry, UK

AN AUDIT OF BISPHOSPHONATE PRESCRIBING AND MONITORING IN PRIMARY CARE

Background: National Osteoporosis Guidelines Group (NOGG) guidance¹ recommends oral bisphosphonate (BP) treatment review at 5 years as pauses may be appropriate for low fracture risk patients to ensure treatment risks and benefits are balanced.

Objective: This audit investigated adherence to the following standard in a rural GP practice: 100% of patients taking a BP for 5 years are reviewed (+/- 6 months) with a FRAX and BMD assessment, unless they met criteria specified by NOGG at their 5-year review.

Methods: Patients commenced on BPs between 01/07/2008-11/05/2017 were identified from current patient records using an EMIS programme search. Patients who had discontinued treatment within 5 years were excluded. The clinical records of the remainder were reviewed.

Results: 82 patients were identified, 44 had discontinued treatment within 5 years (3 due to side effects, 1 due to non-adherence, 40 not documented). 38 patients were on treatment for 5+ years, median age 76 years (range 48-99). 7 patients were on treatment for 10+ years. 21/38 (55%) patients satisfied criteria allowing continuation of therapy without FRAX or BMD assessment (4 due to a previous hip or vertebral fracture, 3 due to a low trauma fracture during treatment, 16 were aged >75, 4 were on daily prednisolone ≥ 7.5 mg). It was unclear from the records whether this had been formally assessed. Of the remaining 17 patients, only 5 (29%) received a FRAX or BMD assessment within the correct timeframe and 5/17 (29%) had no assessment at all.

Conclusion: Only 26/38 (68%) patients met the standard for this audit, and 29% of patients who may have qualified for a treatment pause had no assessment. Documentation regarding treatment plans and assessments was poor. This audit suggests BP prescribing performance can be improved in this practice to reduce potential harm and unnecessary prescriptions. Further assessment of why >50% of current patients discontinued treatment before reaching 5 years is required. A flagging system using EMIS was recommended to review patients on BPs at 5 and 10 years, and infographics will be used to alert the clinician to NOGG guidance. The importance of appropriate documentation was also highlighted. 1.) <https://www.nogg.org.uk/full-guideline>

Final Poster Number: P32

Tiara Gill, Maxine Hogarth

¹Rheumatology, London North West University Healthcare NHS Trust, London, UK

THE UTILITY OF MEASURING MARKERS OF BONE TURNOVER IN A METABOLIC BONE SERVICE

Background: Biochemical markers of bone turnover (BTM) such as N-terminal pro-peptide of type I collagen (P1NP) and serum C-terminal telopeptide (CTX), are being more widely used to help with osteoporosis management and are recommended for monitoring treatment response¹. In 2021, these were implemented in the metabolic bone service (MBS) on a limited basis given potential cost issues.

Aim: A process audit was conducted to assess the utility of measuring P1NP and CTX in the MBS.

Methods: Requests for BTM from Jan21–Aug22 were identified using laboratory records. A retrospective review of clinical notes and investigations was undertaken to determine the indications, outcomes and whether BTM testing changed management. A P1NP decrease by 10ug/L or <35ug/L, or CTX decrease by 100ng/L or <280ng/L was considered indicative of suppressed bone turnover¹.

Results: 33 tests (P1NP 26, CTX 7) were requested on 31 patients, mean age 60yrs (range 24-96), 5 male. Indications were drug pause 13, drug efficacy/monitoring 9, treatment restart 3, metabolic bone disease assessment 6. 12 patients had underlying conditions that potentially affected result validity (recent fracture 5, steroid use 2, renal disease 2, secondary osteoporosis 3). Only 2 CTX tests were done due to technical issues. 8 patients had P1NP <35ug/L, 5 were on bisphosphonates, and 3 were premenopausal with low bone density for age. 2 patients had elevated P1NP, both were on treatment pauses and 1 also had possible hyperparathyroidism. 4 patients had repeat BTM testing. Bone marker measurement was considered to help management decisions in 15 patients (6 treatment withheld/paused, 3 continued same treatment, 2 switched and 4 restarted treatment). For 8 patients the utility of BTM measurement was unclear.

Discussion: BTM measurement helped guide treatment decisions, even as a single measurement. However, the indications in our MBS are not well defined and the advantage of P1NP, which was the commonest test requested over CTX is unclear.

Conclusion: BTM measurement guidelines have been developed, which include relevant exclusion criteria to help ensure requests are appropriate, fully utilised and cost effective.

References: 1.Osteoporos Int(2017) 28:767–774

Jack Boylan¹, Jane Turton¹, Daniel Chappell², Janine Connor³, Viki Sanders⁴, Elizabeth Gadd¹, Rebecca Barbary⁵, Charlotte Toogood⁶, Rachel Eckert⁷, Bilal Khan⁸, Alexandra Guy⁸, Cassandra Chisholm⁹, Nicholas Harvey¹⁰, Mark Baxter¹¹, Madhavi Vindlacheruvu¹², Ken Poole², Michael Stone¹, Kassim Javaid¹³, Opinder Sahota¹⁴, Madeleine Sampson⁸

¹Metabolic Bone Health Department, Cardiff and Vale University Health Board, Cardiff, UK

²Medicine, NIHR Cambridge Biomedical Research Centre, Cambridge, UK

³Fracture Liaison Service, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK

⁴Fracture Liaison Service, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁵Fracture Liaison Service, Nottingham University Hospitals NHS Trust, Nottingham, UK

⁶Fracture Liaison Service, University Hospital Southampton NHS Foundation Trust, Southampton, UK

⁷Fracture Liaison Service, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

⁸Radiology, University Hospital Southampton NHS Foundation Trust, Southampton, UK

⁹Radiology, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK

¹⁰MRC Lifecourse Epidemiology Centre, University of Southampton, Southampton, UK

¹¹Medicine for Older People, University Hospital Southampton NHS Foundation Trust, Southampton, UK

¹²Orthogeriatric Medicine, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

¹³NDORMS, University of Oxford, Oxford, UK

¹⁴Orthogeriatric Medicine, Nottingham University Hospitals NHS Trust, Nottingham, UK

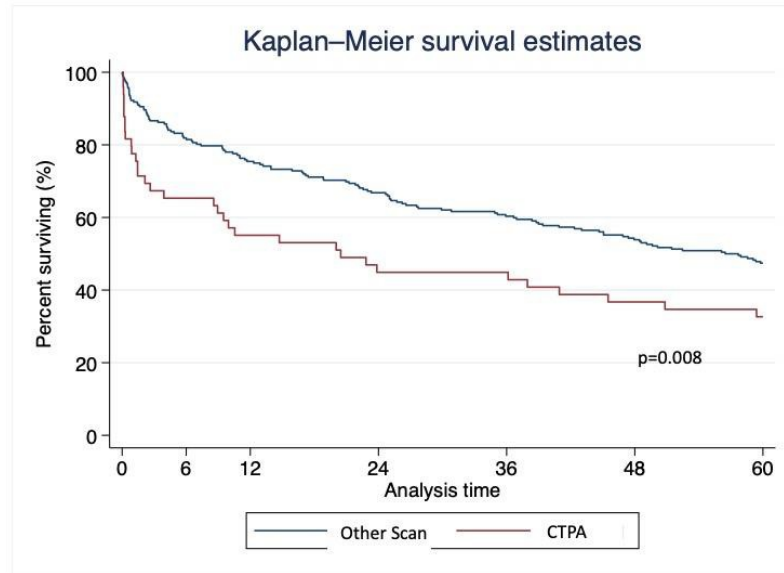
A COMPARATIVE ANALYSIS OF OPPORTUNISTICALLY IDENTIFIED VERTEBRAL FRACTURES USING CT SCANS ACROSS FOUR NHS ORGANISATIONS. DO PATIENTS SURVIVE LONG ENOUGH TO POTENTIALLY BENEFIT FROM FRACTURE PREVENTION INTERVENTIONS?

Background: Vertebral fractures increase morbidity, mortality and fracture risk. Despite effective interventions, up to 70% remain undiagnosed. One recommendation for improving identification is re-reading existing CT scans that include the spine. However, these patients often have significant comorbidities. It is not clear how many patients survive long enough to potentially benefit from fracture prevention interventions.

Objective: To describe survivorship of patients with vertebral fractures identified by opportunistic re-reading of existing CT scans.

Methods: Consecutive CT scans of adults aged 50 and over from 2017 that included an image of the thoracic or lumbar spine were re-read by clinicians with experience in identifying vertebral fractures using the grade 2/3 semi-quantitative Genant score in Cambridge, Cardiff, Nottingham and Southampton. Date of death was extracted from the hospital record system up to five years after the index CT scan. Log-rank tests were used to test for survival differences.

Results: 2084 consecutive scans were re-read. 50.5% were women. The commonest scan types were "CT Abdomen / Pelvis with contrast" (n=576) and "CT Thorax (n=356). CTPA accounted for 138 scans. 282 (13.5%) patients had a moderate or severe fracture, of whom 156 (55.3%) had died by 60 months. 28.4% were dead by 12 months and 37.2% dead by 24 months. Survival was significantly shorter in those with index CTPA scans (Figure).



Discussion & Conclusion: In this audit population, most patients with vertebral fractures diagnosed using their 2017 CT scans survived more than two years. The opportunistically identified vertebral fracture population should benefit from secondary fracture prevention.

Lamees Salman¹, David C Howlett¹, Karl J Drinkwater², Nadia Mahmood³, Jill Griffin⁴, M Kassim Javaid⁵, Ganesh Retnasingam⁶, Abdelaziz Marzoug⁷, Rebecca Greenhalgh⁸

¹Department of Radiology, Eastbourne Hospital, Eastbourne, UK

²Directorate of Education and Professional Practice, The Royal College of Radiologists, London, UK

³Department of Radiology, University Hospitals Sussex NHS Trust, Brighton, UK

⁴The Royal Osteoporosis Society, Bath, UK

⁵The Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Oxford, UK

⁶Department of Radiology, St Helens and Knowsley Teaching Hospitals NHS Trust, Prescot, UK

⁷Department of Radiology, Ninewells Hospital, Dundee, UK

⁸Department of Radiology, London North West University Healthcare NHS Trust, London, UK

RADIOLOGY REPORTING OF INCIDENTAL OSTEOPOROTIC VERTEBRAL FRACTURES COMPUTED TOMOGRAPHY STUDIES: RESULTS OF UK NATIONAL RE-AUDIT

Background: In 2019, the Royal College of Radiologists (RCR) collaborated with the Royal Osteoporosis Society (ROS) and the Royal College of Physicians (RCP) on a UK-wide audit to evaluate patient reporting and organisational infrastructure data in the diagnosis of osteoporotic vertebral fragility fractures (VFFs) on computed tomography (CT). Findings demonstrated overall lack of compliance with targets prompting a series of RCR-led interventions and local quality improvement by ROS. A 2022 re-audit was undertaken to reassess diagnostic performance and organisational practice.

Objective: Four selected headline standards for patient-specific questionnaires included: comment on integrity of the bones in primary report (target 100%), fracture severity assessment (target 90%), use of recommended terminology "vertebral fracture" in relation to described anomalies (target 100%) and recommendations for referral/further assessment (target 100%). Organisational aspects of the questionnaires were related to reporting provision, infrastructure and onward referral system.

Methods: Patient-specific questions involved analysis of CT reporting data acquired from 50 (maximum 100) consecutive non-traumatic studies including the thoracolumbar spine using Genant semi-quantitative approach. UK radiology departments with an RCR registered auditor were invited to participate in this retrospective audit.

Results: 129/194 (67%) departments supplied data from 7316 patients. 21.7% had a VFF on auditor review. Overall improvements were demonstrated in key initial reporting results; comment on spine/bone (93.2%, 14.4% point improvement) with an increase in departmental acquisition of sagittal bony reconstructions and spine/bone review (69.9%, 21.1 % point improvement); fracture severity assessment (34.7%, 8.5% point improvement); use of recommended terminology (67.8%, 7.5% point improvement); recommendations for further management (11.7%, 9.1% point improvement). Organisational responses showed generalised infrastructure improvement with an increase in both Fracture Liaison Service notification (47%; 20% point improvement) and access (44%, 7% point improvement). Selected new organisational responses in the 2022 re-audit showed 11% of departments appointed a radiology lead for osteoporosis and 38% of departments agreed a local policy for VFF reporting.

Conclusion: The 2022 national re-audit confirms improvement in diagnostic performance and organisational practice in VFF with scope to sustain and build on this progress.

Shuna Mighton¹, Nicola Libby²

¹Fracture Liaison Service, NHS Western Isles, Stornoway, UK

²Arthroplasty Practitioner, NHS Western Isles, Stornoway, UK

FRACTURE RISK ASSESSMENT IN PATIENTS UNDERGOING ELECTIVE ARTHROPLASTY: A PILOT STUDY

Background: Fracture risk assessment should be carried out in patients over 50 with clinical risk factors for osteoporosis in whom anti-osteoporosis treatment is being considered (Scottish Intercollegiate Guideline Network, SIGN 142 2020).

Periprosthetic fracture is a recognised complication following total hip or knee arthroplasty. This pilot aimed to evaluate whether pre-arthroplasty fracture risk assessment should be routine.

Methods: 100 consecutive patient undergoing total hip or knee arthroplasty had Q-Fracture assessment during pre-admission clinic. A cut off of 10% total fracture risk over 10 years was used to select patients for DXA. Patients scoring $\geq 10\%$ total fracture risk were offered DXA. Scan reports suggested bone sparing interventions where patients met SIGN 142 treatment thresholds.

Discussion: 66 women and 34 men were included in the pilot, with an age range of 43 to 88 and average of 70.1 years.

Q-Fracture scores ranged from 1% to 35.7%.

35 women (53%) were offered DXA scanning with uptake by 34. 17 were found to meet SIGN 142 thresholds for treatable osteoporosis and management recommendations were made.

4 men (12%) were offered DXA scanning with uptake by all. 2 were found to meet SIGN 142 thresholds for treatable osteoporosis and management recommendations were made.

5 women and 1 man were also found to have previously unidentified vertebral fractures.

Conclusions: Preoperative fracture risk assessment is useful in patients for elective total hip or knee arthroplasty.

Women were 4 times more likely than men to meet the criteria for DXA scanning. Within the limitations of small sample size, women and men were equally likely to have osteoporosis on scanning where Q-Fracture score was 10% or more.

Approximately 1 in 5 of all patients, and 1 in 4 women, undergoing total hip or knee arthroplasty in this centre were found meet the SIGN 142 threshold for osteoporosis treatment. Further study will evaluate whether these findings are replicated across a larger sample size. Long-term large-scale studies would be required to evaluate whether pre-operative fracture risk assessment can impact on incidence of periprosthetic fracture.

Stephanie Hay

¹Osteoporosis Physiotherapy Service, NHS Greater Glasgow & Clyde, Glasgow, UK

**KNOWLEDGE AND CONSIDERATION OF OSTEOPOROSIS AMONGST
PHYSIOTHERAPISTS NOT WORKING IN A SPECIALIST OSTEOPOROSIS ROLE**

Background: Physiotherapists working in acute settings or the community often have patients in their care with underlying osteoporosis. As part of their intervention they may be implementing an exercise programme and therefore require to have a good understanding of the osteoporosis condition and how it may influence their care. The levels of knowledge is expected to vary depending on an individual's seniority and levels of experience and although many may understand the basic principles they may lack the skills and confidence to implement optimal care.

The osteoporosis specialist service aims to provide education and support physiotherapists working with individuals with a variety of health conditions e.g. Rehabilitation, MSK.

Objective: To determine whether the existing local staff NHS website contained was being accessed by targeted individuals and whether the content met their osteoporosis learning needs.

Methods: A questionnaire was distributed to the target groups with questions regarding demographics, whether existing material had been accessed and what resources they would wish to be made available.

Results: Responses were received from 62 NHS physiotherapy staff members. A majority stated that they were not aware of the website and a majority requested guidance on referral to the specialist team as a priority.

An educational page on an easily accessible platform was created displaying links to the specialist team, patient information documents and staff training videos. A follow up survey indicated that responders who had accessed the newly available site reported improved knowledge and understanding of osteoporosis. Individuals based in the acute settings indicated that they were not aware of the new site and their thoughts on osteoporosis was unchanged.

Discussion: This study aimed to determine if physios in non-specialist osteoporosis roles accessed the existing educational material available to them.

Results indicated an expectation that osteoporosis physiotherapy intervention was a specialist role among some physiotherapists. Those responders who accessed the site indicated enhanced osteoporosis knowledge and reported that they had improve confidence working with individuals with osteoporosis.

Conclusion: Accessible relevant educational content on osteoporosis may encourage non specialist physiotherapists to consider osteoporosis when treating patients when it is not their primary health concern.

Inder Singh¹, Antony Johansen^{2,3}

¹Ysbyty Ystrad Fawr, Aneurin Bevan University Health Board, UK

²University Hospital of Wales and School of Medicine, Cardiff University, UK

³National Hip Fracture Database (NHFD), Royal College of Physicians, London, UK

WHO ACTUALLY RECEIVES BONE PROTECTION AFTER A FRAGILITY FRACTURE? AN ANALYSIS OF DATA FROM THE FALLS AND FRAGILITY FRACTURE AUDIT PROGRAMME IN WALES

Background: Each year over 20,000 people in Wales sustain a fragility fracture, but fracture liaison services (FLS) and inpatient orthogeriatrician care remain patchy.

Objective: We examine how this impacts on the likelihood of these patients being offered, and supported to continue, effective bone protection medication.

Methodology: We used data for 2021 from the Fracture Liaison Database (FLSDB) and the National Hip Fracture Database (NHFD); both part of the Falls and Fragility Fracture Audit Programme at the Royal College of Physicians, London.

Results: Only three FLSs in Wales are registered with the FLSDB; between them covering a population with an anticipated burden of 8,495 fragility fractures. In total 1,851 of these patients (22%) were identified by an FLS, and 1,052 (57%) started on treatment. Just 273 (26%) were recorded to be continuing this at one-year follow up. The anticipated 11,820 fragility fracture patients in other health boards are either not supported by an FLS, or are covered by one that doesn't yet report to the FLSSB. In addition, 1,706 of the 4,063 people with a hip fracture in 2021 were started on injectable (19%) or oral (23%) bone protection as an inpatient. NHFD's Key Performance Indicator KPI17 combines patients on injectable treatment with those still taking oral forms of bone protection at 4-month follow-up; a total of 1,211 people (30% of all those with a hip fracture).

Discussion: These figures for Wales highlight missed opportunities for effective secondary prevention. Not all FLSs are registered with the FLSDB, but these figures demonstrate the extent to which orthogeriatric care of inpatients dominates the delivery of bone protection following fragility fracture.

Conclusion: Orthogeriatrician-led care remains a key strategy for secondary prevention after fragility fracture in Wales, but Welsh Government is promoting FLS development and has formally called upon all Health Boards to establish an FLS by September 2024.

2021	NHFD medication on discharge						NHFD follow-up data		FLS-DB follow-up data					
	Hip#s	Den	PTH	Zol	Injected	Oral	KPI17	N	Fragility#s	KPI12	KPI17	Rxed	KPI11	On Rx
BRG	129			2%	2%	3%	19%	25	645					
CLW	315	2%	0%	5%	8%	50%	8%	25	1,575					
GWE	695	3%	0%	37%	40%	23%	56%	389	3,475	22.7%	57.6%	454	9.9%	45
GWY	312	1%	1%	1%	3%	42%	17%	53	1,560					
MOR	527	4%		30%	33%	16%	39%	206	2,635	22.0%	63.5%	368	18.9%	70
PCH	234	1%			1%	12%	1%	2	1,170					
POW	291	1%		1%	2%	11%	2%	6	1,455					
RGH	236	1%			1%	28%	6%	14	1,180					
UHW	477	2%		51%	54%	10%	67%	320	2,385	20.5%	48.0%	235	69.3%	163
WRX	281				0%	34%	1%	3	1,405					
WWG	356	1%		4%	5%	31%	17%	61	1,780					
WYB	210			1%	1%	9%	8%	17	1,050					
All WALES	4,063	2%	0%	17%	19%	23%	30%	1,211	20,315	21.8%	56.8%	1,052	26.0%	273
All FFFAP	66,291	5%	0%	12%	17%	34%	32%	21,014	331,455	38.7%	55.2%		19.3%	

Final Poster Number: P38

Jane Fleming^{1,2}, Danuta Puchacz-Kadioglu¹, Karen Blesic¹, Phil Gorman¹, Maria Caracuel Uroz¹, Jessica Taylor¹, Zoe Reyes³, Christopher Chan⁴, Madhavi Vindlacheruvu⁵

¹Addenbrooke's Hospital Fracture Liaison Service, Department of Rheumatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

²Cambridge Public Health, University of Cambridge, Cambridge, UK

³Department of Physiotherapy, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁴Metabolic Bone Unit, Department of Rheumatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁵Department of Medicine for the Elderly, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

PATIENT REPORTED EXERCISE ACTIVITY AND PHYSIOTHERAPY INPUT FOLLOWING FRAGILITY FRACTURE PRE- AND POST-PANDEMIC: EVALUATION OF COVID-19 IMPACTS USING FRACTURE LIAISON SERVICE CLINIC DATA

Background: Effects of Covid-19 pandemic lockdowns and health service pressures on older people's mobility are acknowledged but difficult to quantify. Our Fracture Liaison Service (FLS) was aware of local impacts on access to services to which we refer patients. Routine FLS follow-ups include assessment of need for falls prevention/physiotherapy/exercise classes.

Objectives: To examine pre-/post-Covid-19 physiotherapy and exercise participation using clinic data.

Methods: Retrospective notes review (2019-2021) and prospective documentation (2022) measuring patients' physiotherapy input and exercise level 3-4 months post-fracture.

Results: We identified 7,000 fragility fracture patients over the four years January 2019-December 2022. 2,539 were discharged after DEXA and fracture risk assessment or because they lived 'out of area' for our service. 428 died before their follow-up and 215 could not be contacted. 3816 patients had 4-month follow-up telephone appointments (50:50 aged 50-75 and >75 years old). Almost all 2019 patients' 3-4 month follow-ups were completed before late March 2020's first lockdown. Across 2019-2021 >40% reported they had not seen any physiotherapist since their fracture, including a small but rising fraction referred but still awaiting assessment. Both proportions fell by over half in 2022. There was a doubling of the proportion of patients who reported that their only NHS advice regarding exercise following their fracture was from an exercise leaflet (2019: 7.5%, 2022: 15%). Use of private physiotherapy was uncommon but increased steeply (2019: 1%, 2021: 6%) and significantly in both age-groups ($p=0.03$ and $p<0.01$). Most had had no NHS physiotherapy but 42% sought private physiotherapy after some NHS physiotherapy, feeling that was insufficient. Patients reported that they exercised regularly or were physically active significantly less commonly during 2020 and 2021 than in 2019 ($p=0.01$) or in 2022 ($p<0.001$), while proportions reporting inactivity/low activity levels or saying they only exercised occasionally rose in 2020-2021. This pattern was markedly clearer amongst >75-year-olds ($p<0.001$) than at younger ages (non-significant). Pre-pandemic 12.5% of patients reported attending exercise groups as well as regular home exercising, drastically reduced to only 1% in 2022.

Conclusion: Although reported home exercise/activity engagement increased since lockdowns, community-based exercise groups important for fall prevention appear struggling to re-establish after Covid-19 restrictions.

Deborah Nelson¹, Elizabeth Thomas², Rose Stone¹, Julia Thomson¹, Rachel Ashcroft-Hands¹, Kirsty Carne¹, Vivienne Fairclough¹, Helen Gilmour¹, Niki Gonty¹, Claire Lewis¹, Tina Stoodley¹, Beverley Vale¹

¹Clinical Directorate, Royal Osteoporosis Society, Bath, UK

²Freelance medical writer, EThomas Research, Stockholm, Sweden

IMPACT OF A SPECIALIST NURSE TELEPHONE HELPLINE ON INTENTION TO INITIATE OR CONTINUE OSTEOPOROSIS MEDICATION

Background: Osteoporotic fractures are associated with morbidity, mortality and costs. Many people decline treatment over fears or misunderstandings about medication; however, contact with healthcare professionals (HCP) can support medication adherence. Data are presented from the 2022 service audit of a UK-wide osteoporosis specialist nurse helpline (OSNhelp), that annually responds to >13,000 *enquires*.
Objective: Explore the extent that contact with OSNhelp impacts callers' intention to initiate or persist with osteoporosis *treatment*.

Methods: A 2021 pilot study informed the survey design. Data was collected from 31st October to 2nd December 2022. Participants were recruited during helpline phone calls and validated surveys were subsequently provided to elicit quantitative and qualitative data on a range of topics.

Results: 273 participants returned surveys for analysis (49% response rate). Respondents were predominantly highly educated, affluent, white women >60 years old. 90% have osteoporosis and 58% also had fracture(s). 66% called about drug treatments, of whom 98% agreed the call helped them understand medication and why it was prescribed. 90% reported decreased concerns about side effects. 86% agreed the call helped them reach decisions to start or continue treatment. 33% decided against offered treatment, indicating the call prompted pursuit of alternative treatment options. 96% felt better prepared for conversations with HCP. Qualitative responses consistently show callers valuing the specialist expertise, empathetic and individualised support from OSNhelp; 10% reported barriers to accessing this from NHS sources.

Discussion: Seeking to understand drug treatments is the main reason people contact OSNhelp, perhaps reflecting the complex natures of treatment and increasing NHS pressures. Respondents reported contact with OSNhelp facilitated better understanding of treatment rationale, eased concerns about side effects and empowered some to self-advocate for alternative *treatment*.

Conclusion: Contact with OSNhelp impacts callers' perceptions of treatment in a meaningful and positive way. With diminishing NHS resources, patients who cannot access information and support they need to make genuinely informed choices often decline treatment. The OSNhelp, with highly experienced and expert nurses can support those who may otherwise fall through the treatment gap.

Deborah Nelson¹, Elizabeth Thomas², Rose Stone¹, Julia Thomson¹, Rachel Ashcroft-Hands¹, Kirsty Carne¹, Vivienne Fairclough¹, Helen Gilmour¹, Niki Gonty¹, Claire Lewis¹, Tina Stoodley¹, Beverley Vale¹
¹Clinical Directorate, Royal Osteoporosis Society, Bath, UK

²Independent Programme Evaluator, Elizabeth Thomas Research, Stockholm, Sweden

CHARACTERISTICS OF CALLERS CONTACTING A NATION-WIDE OSTEOPOROSIS SPECIALIST NURSE TELEPHONE HELPLINE

Background: Osteoporotic fractures (OPF) most commonly affect older, white women. Nevertheless, fractures are not rare among others aged ≥ 50 . Contact with healthcare professionals can support engagement with strategies to attenuate fracture risk. Data are presented from the 2022 service audit of a UK-wide osteoporosis specialist nurse helpline (OSNhelp), that annually responds to >13,000 enquires. This audit shows that OSNhelp impacts callers' perceptions of treatment and supports self-advocacy in a meaningful and positive way; however, this relies upon people choosing to contact OSNhelp. Understanding who currently uses OSNhelp can inform future strategies to promote broader reach and equity.
Objective: Explore the characteristics of callers using OSNhelp and to identify relevant at-risk groups who do

not.

Methods: A 2021 pilot study informed the survey design. Data was collected from 31st October to 2nd December 2022. Participants were recruited during helpline phone calls and validated surveys subsequently elicited quantitative and qualitative data on a range of topics.

Results: 273 participants returned surveys for analysis (49% response rate). A majority have osteoporosis (90%) and fractures (58%). Respondents were predominantly highly educated, affluent, white women >60 years old. The remaining respondents were: 4.7% male; 1.5% non-white ethnicity; indices of multiple deprivation data were available for n=141, of whom 30% were from deciles 1 to 5 (most deprived); and 59% report holding degree level qualification or higher.

Discussion: The homogeneity among OSNhelp users is inconsistent with known distribution of OPF prevalence in the UK. Although less likely to fracture than older white women, when fractures occur among men, non-white women and those from lower socioeconomic groups it is often at a younger age and associated with greater morbidity and mortality.

Conclusion: OSNhelp can support engagement with fracture-risk reduction strategies but only if people are aware of it, believe it is accessible to them and accept this model of support. Unfortunately, many of those likely to be impacted by healthcare inequalities, are least likely to access the helpline and the benefits it can provide. Promoting equitable access is the top priority for the helpline in 2023.

Rosie Turner¹, Clare Jinks¹, Siobhan Holohan³, Zoe Paskins^{1,2}

¹School of Medicine, Keele University, Keele, UK

²Haywood Academic Rheumatology Centre, Haywood Hospital, Stoke-on-Trent, UK

³School of Social, Political and Global Studies, Keele University, Keele, UK

PRINT AND ONLINE NEWS REPRESENTATIONS OF OSTEOPOROSIS AND ITS TREATMENT IN THE UK: A FRAMING ANALYSIS

Background: Experts have claimed that negative media messages about osteoporosis are contributing to the “osteoporosis crisis”. However, we know little about how osteoporosis appears in the media. *Objective:* Identify how osteoporosis and its treatment appear in UK print and online newspapers. *Methods:* A ProQuest search of twelve highly circulated newspapers between the 1st of October 2019 and the 30th of September 2020 was conducted using the keyword “osteoporosis” and keywords relating to eight other long-term conditions (LTCs) to compare the amount of coverage. Next, the search on articles relating to osteoporosis was extended by using the search function on newspaper’s websites. Articles containing the keyword “osteoporosis” were subject to a framing analysis where dominant frames and their components (problem definition, causal attribution, moral evaluation, and treatment recommendation) were identified. *Results:* Less articles were published containing the keyword “osteoporosis” (n=148) compared to other LTCs (“rheumatoid arthritis” (n=194) to “cancer” (n=9,644)). A framing analysis of 218 articles showed three frames: Biomedical (n=53 articles), Lifestyle (n=47 articles) and Human-Interest (n=118 articles). Osteoporosis was presented as a problem of menopause and ageing across frames. Cause was attributed to either an imbalance in bone turnover (Biomedical), poor diet and inactivity (Lifestyle) and often disordered eating and menopause (Human-Interest). Moral evaluations included descriptions of osteoporosis as serious (Biomedical), women as vulnerable (Lifestyle), and people affected as disabled and suffering (Human-Interest). Treatment recommendations included pharmaceuticals (Biomedical), or prevention through lifestyle choices (Lifestyle). Human-interest stories served to increase awareness of osteoporosis, and included wealthy and royal celebrities or lay perspectives, describing those affected as victims and sufferers. *Discussion:* This study shows osteoporosis receives less media attention than other LTCs. There was little overlap between biomedical, and lifestyle components, emphasizing osteoporosis as either a serious condition requiring medical intervention or as a self-inflicted condition controllable through individual actions. Human-interest stories highlighted pain and suffering of those afflicted. *Conclusion:* Results informed focus groups exploring perceptions of media about osteoporosis and will contribute to co-production of recommendations for media reporting on osteoporosis. *Conflicting Interests:* This work is funded by a Versus Arthritis PhD Scholarship. ZP is funded by the National Institute for Health Research (NIHR) (Clinician Scientist Award (CS-2018-18-ST2- 010)/NIHR Academy). CJ is part funded by the NIHR Applied Research Collaboration (ARC) West Midlands

Final Poster Number: P42

Rosie Turner¹, Clare Jinks¹, Siobhan Holohan³, Zoe Paskins^{1,2}

¹School of Medicine, Keele University, Keele, UK

²Haywood Academic Rheumatology Centre, Haywood Hospital, Midlands Partnership NHS Foundation Trust, UK

³School of Social, Political and Global Studies, Keele University, Keele, UK

AUDIENCE RECEPTION OF MEDIA MESSAGES ABOUT OSTEOPOROSIS AND ITS TREATMENT: A FOCUS GROUP STUDY

Background: This research is situated in response to expert claims that negative media messages about osteoporosis are contributing to the “osteoporosis crisis”. News media is known to impact health beliefs and behaviours.

Objective: To understand the impact of media messages about osteoporosis on people’s perceptions of the condition and its treatment.

Methods: Four focus groups were conducted: two with people with osteoporosis and their carers, one with people aged 40-60 at risk of the condition, and one with health professionals who care for people with osteoporosis. Participants were shown articles containing representations of osteoporosis and asked to discuss the content.

Results: A framework analysis revealed three themes including Mis/trust, Personal Control, and Uncertainty. People with osteoporosis and their carers described mistrust in osteoporosis drugs, experts, and organisations. People aged 40-60 also described mistrust in the safety of osteoporosis drugs, yet health professionals felt lay people would mostly trust information presented in articles. People with osteoporosis and their carers wanted to take control of the management of their condition, prioritising lifestyle management, yet rejected lifestyle advice associated with stereotypes (e.g. women’s activities) and physical activities which were perceived as inaccessible. All groups highlighted content which placed responsibility and blame for the condition on the individual. People aged 40-60 externalised the risk of developing osteoporosis, possibly due to stigma, suggesting articles were irrelevant to them. People aged 40-60 expressed uncertainty about the cause, impact, and who is affected by the condition. Representations of people with osteoporosis in the articles raised questions about the prognosis of the condition. Healthcare professionals reflected on inconsistent use of the terms treatment and prevention which made them reflect on their own practice.

Discussion: Findings suggest media messages about osteoporosis and its treatment impact audiences in various ways which are shaped by their experiences. Mistrust and perceived lack of relevance resulted in articles having little reported impact on participants’ intended behaviours.

Conclusion: Results from this study will be used to inform the co-production of recommendations to improve media reporting of osteoporosis and its treatment.

Conflicting Interests: This work is funded by a Versus Arthritis PhD Scholarship. ZP is funded by the National Institute for Health Research (NIHR) (Clinician Scientist Award (CS-2018-18-ST2- 010)/NIHR Academy). CJ is part funded by the NIHR Applied Research Collaboration (ARC) West Midlands

Benjamin Lopez¹, Robert Meertens², Michael Grundy², Paul Scott¹

¹Advanced Medical Devices, IBEX Innovations Ltd, Sedgefield, County Durham, UK

²Medical Imaging, University of Exeter, Exeter, Devon, UK

RADIAL BONE DENSITY MEASUREMENT AS A PREDICTOR OF OSTEOPOROSIS AND 10-YEAR FRACTURE RISK AT THE FEMORAL NECK – AN OPTION FOR TREATMENT DECISIONS WHERE FEMORAL NECK AREAL BONE MINERAL DENSITY CANNOT BE OBTAINED?

Background: Obtaining a T-score at the femoral neck (FN) is often difficult due to reduced patient mobility and Dual Energy X-ray Absorptiometry (DXA) equipment or operator shortages. 10-year fracture risk using FRAX also requires consultation with a trained medical professional to ensure accuracy.

Objective: Assessment of the accuracy of osteoporosis prediction at the FN and FRAX-based 10-year fracture risk, using only the patient's age, sex and T-score measured at the ultra-distal radius (UDR). This was compared to a reference assessment at the FN using DXA and FRAX.

Materials and Methods: 261 participants over the age of fifty were recruited in this single-centre, nonrandomised, prospective study. Participants underwent FRAX assessment, bilateral posterior-anterior wrist radiographs, and DXA of wrists, hips and lumbar spine (LS). A classifier was created by fitting a model to the data. Comparisons were made between predicted and observed osteoporosis at the FN in following scenarios: (1) age and sex only, (2) LS T-score + age and sex, (3) UDR T-score + age and sex, (4) X-ray based device for measuring UDR T-score + age and sex.

Results: Comparison of area under the receiver operator characteristic curve (AUC) shows that age and sex alone provide the poorest predictor of osteoporosis at the FN, AUC=0.771 (99% Confidence Interval (CI) [0.689, 0.853]).

Addition of DXA T-score at the UDR or LS increases accuracy, which is expected. Notably the AUCs overlap within 99% CIs, UDR AUC=0.899 (99% CI [0.844, 0.955]) and LS AUC=0.878 (99% CI [0.796, 0.960]).

The X-ray based device used at the UDR also overlaps DXA at the UDR within 99% confidence intervals, AUC=0.868 (99% CI [0.81, 0.925]).

Discussion/Conclusion: There are many instances where it is difficult to obtain a T-score at the FN and/or accurate patient risk factor information.

The UDR provides a convenient alternative, of particular relevance with the advent of new wrist-based technologies. Further work is needed to understand clinical context and acceptance.

Conflicting Interests: This study was funded by Ibex Innovations Ltd. The co-authors of this talk, IBEX Innovations Ltd., hold the intellectual property rights over the IBEX BH technology and has a vested interest in the adoption of this technology into clinical practice. There are no other conflicts of interest to declare.

Eun Ji Kim^{1,2}, Amelia Moore³, Dwight Dulnoan³, Geeta Hampson^{1,2,3}

¹Department of Chemical pathology and Metabolic Medicine, St Thomas' hospital, London, UK

²Metabolic bone clinic, Department of Rheumatology, Guy's Hospital, London, UK

³Osteoporosis Unit, Guy's Hospital, London, UK

EFFECT OF FIBROBLAST GROWTH FACTOR (FGF) 19 AND 21 ON HIP STRENGTH IN POST-MENOPAUSAL OSTEOPOROSIS (PMO)

Background: FGF receptor signaling is important for skeletal development. The FGF19 subfamily which includes FGF 19 and FGF 21 are involved in bone metabolism, although their effects on bone mineral density (BMD) and bone strength remain unclear.

Objective: To further characterise the influence of these 2 factors on the skeleton, we studied the association between circulating concentrations of FGF 19 and 21 with BMD and parameters of hip geometry and strength in post-menopausal osteoporosis (PMO).

Method: The study cohort consisted of 374 women aged (mean [SD]) 68.7[12.3] years with PMO. FGF 19 and FGF 21 were measured in serum by ELISA. BMD at the lumbar spine (LS), total hip (TH) and femoral neck (FN) (n=277) and hip structural analysis (HSA) parameters (n= 263) at the narrow neck of the femur (NN), Inter-trochanter (IT) and Femoral shaft (FS) were derived from DXA scans.

Results: FGF 19 and 21 were not associated with prevalent fractures or BMD when corrected for covariates; age, BMI, lifestyle factors. Among the HSA parameters, serum FGF 19 was negatively associated with sub-periosteal/outer diameter (OD) at the IT (IT:beta -0.141 $p=0.026$), cross-sectional area at the IT and FS (CSA) (IT:beta -0.180 $p=0.003$, FS:beta -0.137 $p=0.019$) and hip mechanical parameters; cross sectional moment of inertia (CSMI) (IT:beta -0.163 $p=0.009$, FS: beta -0.132 $p=0.031$) and section modulus (Z) (IT:beta -0.15 $p=0.013$, FS: beta -0.142 $p=0.017$). FGF 21 was also negatively associated with OD (IT:beta -0.188 $p=0.003$, FS:beta -0.15 $p=0.019$) endocortical diameter (ED) (IT:beta -0.14 $p=0.028$, FS: beta -0.126 $p=0.048$), CSA (IT:beta -0.176 $p=0.004$), CSMI (IT:beta -0.206 $p=0.001$, FS: beta -0.176 $p=0.004$), Z (IT:beta -0.221 $p<0.001$, FS: beta -0.167 $p=0.006$).

Discussion: Our data suggest that both FGF 19 and 21 may have potentially adverse effects on the skeleton. This may be related to the inhibitory effects of FGF 21 on osteoblastogenesis and FGF 19 on hepatic bile acid synthesis.

Conclusion: Further confirmatory studies are needed, particularly as FGF 21 analogues or agonists are used to treat metabolic disorders such diabetes mellitus and obesity.

Final Poster Number: P45

WITHDRAWN

Katy Knight¹, Richard Fordham², Karen Knapp¹

¹Faculty of Health and Life Sciences, University of Exeter, Exeter, UK

²Norwich Medical School, University of East Anglia, Norwich, UK

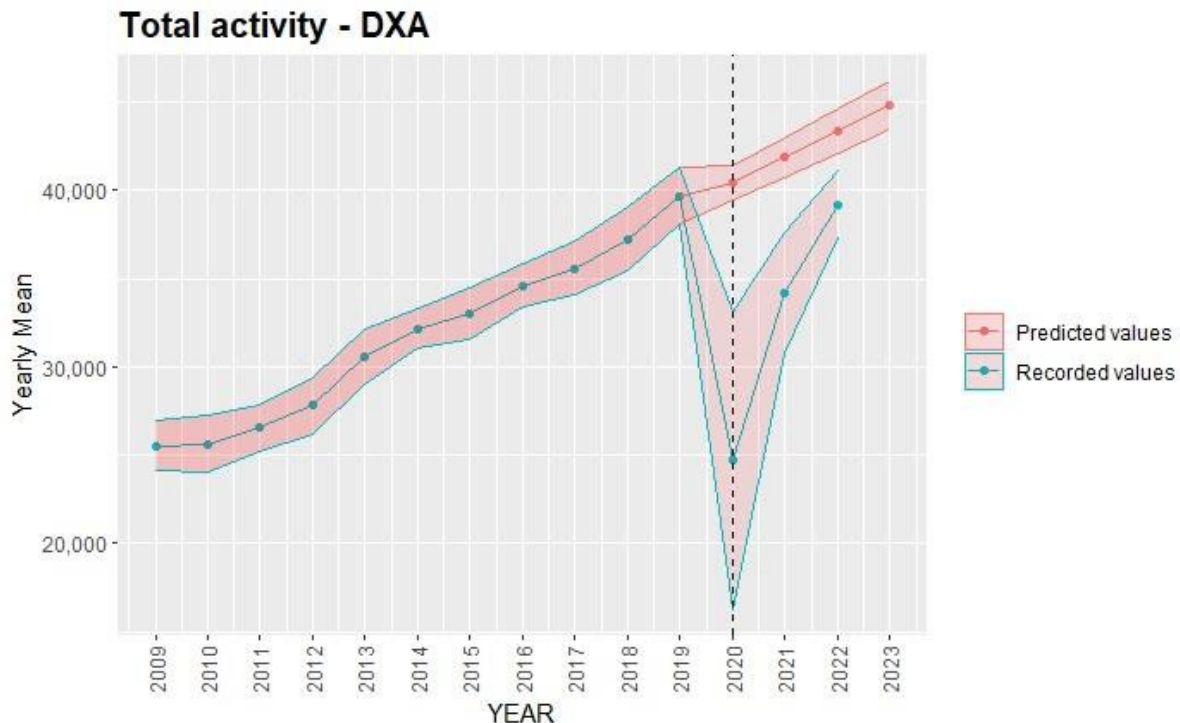
THE IMPACT OF COVID-19 ON DUAL-ENERGY X-RAY ABSORPTIOMETRY SERVICES IN ENGLAND

Introduction: In March 2019 COVID-19 resulted in national lockdowns and the cessation of routine work in the NHS. Dual-energy x-ray absorptiometry (DXA) services ceased in the majority of providers across the UK. The aim of this study was to evaluate the impact of COVID-19 on DXA activity and waiting lists in England between March 2019 and December 2022.

Methods: Data from March 2019 to December 2022 were downloaded from NHS digital diagnostics waiting times and activities (DM01). Total waiting list data were analysed for the total dataset and for the seven regions in England. Data were analysed for total activity based on the actual figures and regression analysis performed to extrapolate the expected activity if COVID-19 had not occurred using R.

Results: The total waiting list increased from an average of 31,851 pre COVID-19 to 60,059 and the percentage of patients waiting 13 or more weeks increased from an average of 0% pre COVID-19 to 16.8 % in 2022. There were differences between the 13+ waiting list across the seven NHS regions in England, with three making good progress on reducing their waiting lists, while four regions have continuing high numbers of patients waiting 13 or more weeks.

Figure 1: Yearly mean values for DXA total activity in England, showing actual values for 2009 - 2022 and predicted values (based on the pre-Covid-19 linear trend) for 2020 - 2023. 95% confidence intervals are shown in red. Dashed line indicates the first Covid-19 lockdown in England. **Conclusion:** COVID-19 had resulted in increased waiting lists for DXA scans and recovery is still in progress in four of the seven NHS regions. There is inequity regarding timely access to DXA services across England. The total DXA activity in England has not recovered to pre-COVID-19 levels and this poses a risk of delays in diagnosis and treatment for patients with osteoporosis.



Antony Johansen^{1,2}, Opinder Sahota³, Kassim Javaid^{2,4}, Celia Gregson⁵

¹Trauma Unit, University Hospital of Wales, Cardiff, UK

²Falls and Fragility Fracture Audit Programme, Royal College of Physicians, London, UK

³Dept. Health Care of Older People, Nottingham University Hospital NHS Trust, Nottingham, UK

⁴NDORMS, University of Oxford, Oxford, UK

⁵Musculoskeletal Research Unit, Bristol Medical School, Bristol, UK

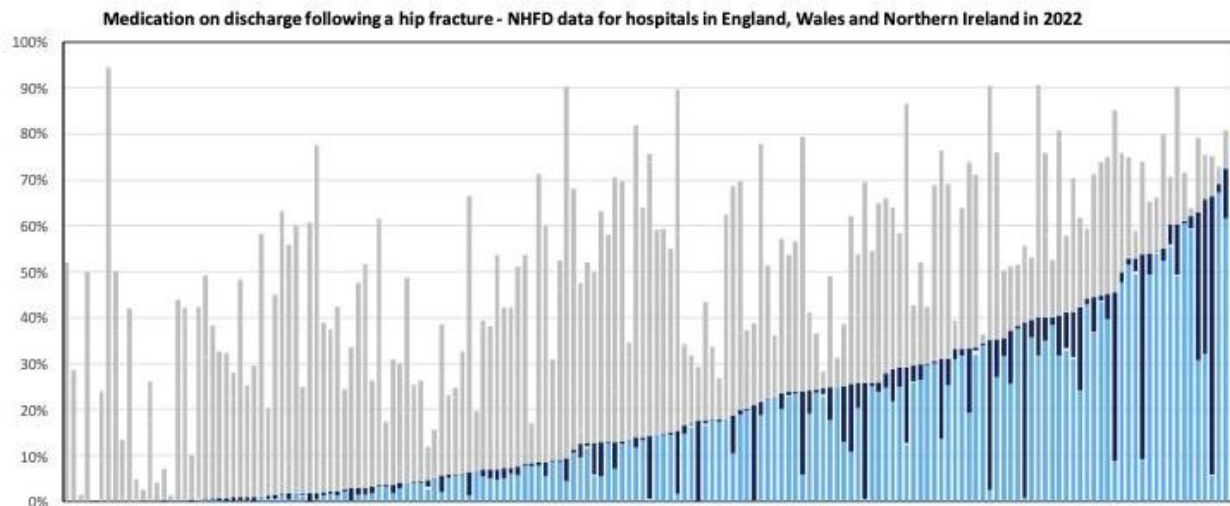
ZOLEDRONATE AS SECONDARY PREVENTION AFTER HIP FRACTURE — HOW BIG IS THE MISSED OPPORTUNITY?

Background: Following a hip fracture intravenous zoledronate (IV Zol) reduces the risk of clinical fractures by 35%. It is recommended by the National Osteoporosis Guideline Group (NOGG 2021) as first line in this patient group; in part reflecting the critical benefit over oral therapies of ensuring 100% adherence after initiation.

Objective: To describe the proportion of patients with an incident hip fracture receiving IV Zol vs. other forms of bone protection.

Methodology: In April 2023 we analysed data from the National Hip Fracture Database (NHFD) for 70,991 patients, in all 169 trauma units of England, Wales and Northern Ireland in 2022.

Results: By the time of their discharge after a hip fracture 27.9% had been started on oral bisphosphonates, 3.3% on alfacalcidol or calcitriol, and 21.9% on injectable bone treatment. A further 17.9% had been referred for DXA or bone clinic follow-up. Use of injectable treatment varied from 0-80% between different hospitals (Figure).



This represents a 50% increase in injectable treatment from 14.4% in 2020, largely reflecting an increase in patients started on IV Zol, which increased from 9.0% in 2020, to 16.5% in 2022. The remaining 29.0% of patients weren't started on treatment or referred for follow-up, and the proportion labelled as 'assessed as not needing treatment' varied from none to two-thirds (66.5%) of cases in different hospitals.

Discussion: Several hospitals are already giving IV Zol to more than half of their patients, showing this to be feasibility; however, most hospitals are yet to set-up effective post-operative IV Zol administration. If all hospitals gave 50% of their caseload IV Zol then each year an additional 25,000 patients at very high imminent risk of re-fracture would be started on this inexpensive but effective treatment before leaving hospital.

Conflicting Interests: The authors include the clinical leads for the NHFD and the FLSDB

Antony Johansen^{1,2}, William Eardley^{2,3}

¹Trauma Unit, University Hospital of Wales, Cardiff, UK

²National Hip Fracture Database (NHFD), Royal College of Physicians, London, UK

³Trauma and Orthopaedics, South Tees Foundation NHS Trust, South Tees, UK

MAPPING THE COVID-19 PANDEMIC IN THE UK — USING DATA FROM THE NATIONAL HIP FRACTURE DATABASE (NHFD)

Background: From the start of the pandemic in 2020 the National Hip Fracture Database (NHFD) has recorded of whether individual patients were infected with COVID-19. This allowed the NHFD to map rates of infection and in particular hospital-acquired infection, and to use this information when identifying hospitals with significantly raised 30-day mortality.

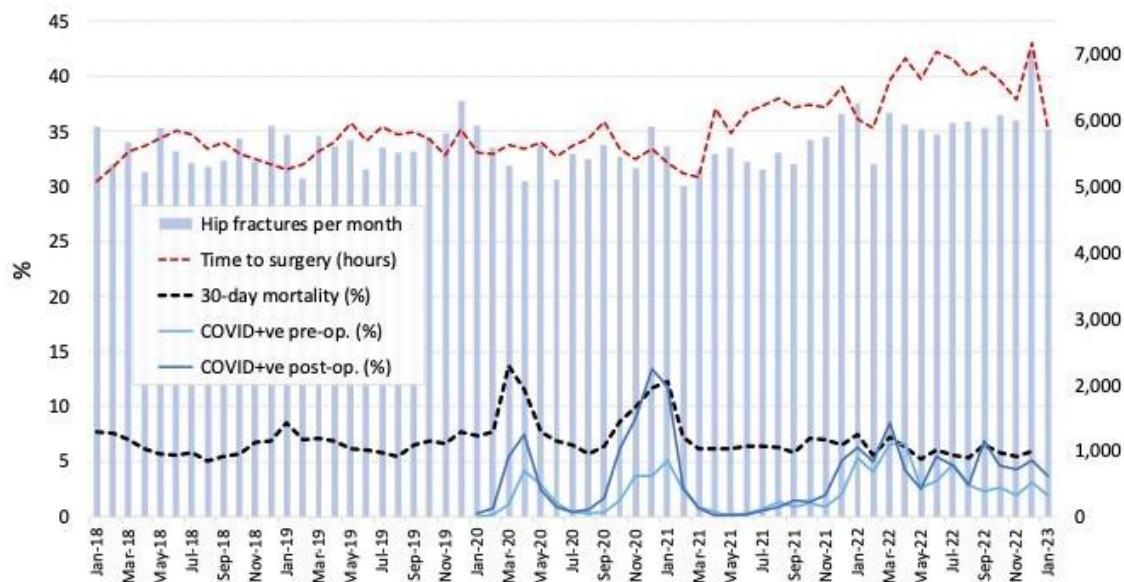
Methodology: We examine data from the NHFD website (www.nhfd.co.uk) to establish trends in hip fracture services as the UK moves into a period of 'recovery' following the pandemic.

Results: At the peak of the second wave in December 2020 one in six patients with hip fracture (17%) were recorded as COVID-positive either before (4%) or after (13%) surgery. 30-day mortality peaked at 14% in March 2020, and the second-wave led to a second peak at 12% for people who presented in January 2021. These figures are twice those recorded in the summers before and after the pandemic. However, COVID-19 infection continues to be a challenge, and ranged from 5-10% across 2022. December 2022 saw the highest monthly hip fractures ever recorded — over 7,000, compared to a usual NHFD figure of 6,000/month. The mean age of patients presenting with hip fracture between 2019 and 2022; the proportion aged 80+ falling from 75.1% to 71.3% perhaps reflecting greater mortality in oldest population age groups during the pandemic and/or deconditioning and increased falls and fracture risk since then.

Discussion: The improvement in 30-day mortality despite persistent COVID-19 infections in 2022 reflects the public-health triumph of the vaccination programme, and improving treatment options.

Conclusions: It is a concern that the period following the pandemic is seeing escalating total hip fracture numbers in a frailer population that may reflect and compound deterioration in patients' access to high quality care such as prompt surgery.

Conflicting Interests: The authors are clinical leads for the NHFD.



Final Poster Number: P49

Ashley Hawarden^{1,2}, Jack Boylan³, Natasha Cox^{1,2}, Nadia Corp¹, Jo Protheroe¹, Clare Jinks¹, Zoe Paskins^{1,2}

¹School of Medicine, Keele University, Staffordshire, UK

²Haywood Academic Rheumatology Centre, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

³Geriatric Department, Cardiff and Vale University Health Board, Cardiff, UK

PRIMARY CARE PRACTITIONERS' VIEWS ON BARRIERS AND ENABLERS OF OSTEOPOROSIS CARE: A SCOPING REVIEW

Background: Primary care practitioners (PCPs) play a central role in the care of people with, or at risk of, osteoporosis. Despite this, there is evidence of suboptimal identification, investigation, and long-term follow-up of osteoporosis in primary care settings.

Objective: To identify and map the scope of existing qualitative evidence in relation to the barriers and enablers of osteoporosis management in primary care.

Methods: We searched OVID MEDLINE, EMBASE, AMED, CINAHLPlus, PsychINFO, ASSIA and Web of Science (SSCI) on the 11/10/22 using a comprehensive search strategy. We included qualitative and mixed methods studies that focused on the experiences and perceptions of PCPs towards osteoporosis management published from 2008. Two reviewers independently screened titles, abstracts, and full texts for eligibility. Discrepancies were resolved by a third reviewer. Data was extracted from included studies by three reviewers. Barriers and enablers in the included papers were identified and mapped them to the Theoretical Domains Framework (TDF).

Results: Sixteen studies met our inclusion criteria none of which were from the United Kingdom (UK). Barriers and enablers were mapped to 12/14 TDF domains, and additional organisational barriers were identified. The most frequently reported barriers and enablers mapped to the domains of knowledge, skills, intentions, social/professional role and identity and environmental context and resources. Key barriers included a perceived lack of knowledge and understanding of osteoporosis and guidelines, difficulty and lack of confidence with clinical decision making, lack of prioritisation of osteoporosis care, poorly defined clinical roles and in-effective communication with secondary care, and restricted time for consultations.

Organisational barriers included lack of prioritisation and absence of clear patient pathways.

Discussion: This scoping review has identified several barriers to evidence-based osteoporosis care. Enablers might include robust and clearly defined patient pathways (including clarification of professional roles), accessible guidelines for identification and treatment, education, integration of primary and secondary care services and involvement of the wider multidisciplinary team in osteoporosis care.

Conclusion: Further work is needed to develop strategies and resources to address the identified barriers to osteoporosis care, particularly, in UK primary care settings.

Chelsea Kettle¹, Jo Butterworth², Jill Griffin^{3,4}, Beverly Henderson⁵, Clare Jinks¹, Karen Knapp⁶, Fay Manning⁶, Ashley Hawarden^{1,7}, Rosie Turner¹, Nicola Evans¹, Kay Stevenson¹, Laura Swaithes¹, Lorna Bullock¹, Zoe Paskins^{1,7}

¹School of Medicine, Keele University, Staffordshire, UK

²Exeter Collaboration for Academic Primary Care (APEX), University of Exeter Medical School, Devon, UK

³Healthy Bones Service, Derriford Hospital, University Hospitals Plymouth NHS Trust, Plymouth, UK

⁴Royal Osteoporosis Society, Bath, UK

⁵Keele University Research User Group, Keele University, Staffordshire, UK

⁶Faculty of Health and Life Sciences, University of Exeter, Devon, UK

⁷Haywood Academic Rheumatology Centre, Haywood Hospital, Midlands Partnership University NHS Foundation Trust, Staffordshire, UK

KNOWLEDGE MOBILISATION TO ADDRESS THE OSTEOPOROSIS CARE GAP USING A COMMUNITY OF PRACTICE APPROACH

Background: Community of Practice (CoP) is a methodology using a diverse group of individuals with equal voice to discuss a shared topic of interest, offering a strategy for mobilising knowledge into practice.

Objective: To demonstrate the potential benefits of a CoP approach for knowledge mobilisation to address the osteoporosis care gap, using the Improving uNderstanding of bone DEnsity (dXa) scans (INDEX) study as an example case.

Methods: CoP membership was open to individuals with varying clinical, industry or lay backgrounds, expressing interest in research involvement and improving osteoporosis care, and was advertised on social media, through known networks and at healthcare professional meetings. Members are invited to study or topic-specific meetings. Preparation materials to guide discussion are sent before each CoP meeting. During each meeting, meeting goals (relevant to research design, interpretation, or dissemination) are presented, and attendees are encouraged to establish personal goals. Afterwards, findings are shared with a 'we asked, you said, we did' approach and attendees are asked to feedback learning or reflections.

Results: CoP membership consists of 62 members. 16 professionals and two persons with lived experience attended the first online INDEX meeting. Attendees discussed their experience of writing/receiving dual-energy X-ray absorptiometry (DXA) reports, different report styles, and what resources would enhance report understanding. Discussion points included: i) optimal DXA report content and structure ii) variation of DXA availability (e.g. in patients ≥ 75 -years old) iii) a need to support patients in understanding reports using additional leaflets, animations or patient-friendly reports iv). One service reported they changed their report formatting following the meeting.

Discussion: The CoP discussions informed the INDEX research design and planned knowledge mobilisation resources. Although the INDEX study aims to ultimately produce recommendations for optimising DXA report understanding, early CoP discussions are already mobilising knowledge into practice. Discussions were fed back to the Royal Osteoporosis Society policy team to inform All-Party Parliamentary Group discussions.

Conclusion: CoP methodology is a novel method within the field of osteoporosis and has potential to mobilise knowledge of benefit to research, clinical practice, and policy.

Conflicting Interest: The Improving uNderstanding of bone DEnsity (dXa) scans (INDEX) study is funded by the Royal Osteoporosis Society (ROS) Research Grant 2021 (REF:478). ZP is funded by the National Institute for Health Research (NIHR), Clinician Scientist Award (CS-2018-18-ST2-010)/NIHR Academy. FM is funded by the NIHR Applied Research Collaboration South West Peninsula. CJ is part funded by NIHR Applied Research Collaboration (ARC) West Midlands. JB is funded by a NIHR Doctoral Fellowship award (2017-10-005). AH is funded by a Versus Arthritis Clinical Research Fellowship (REF:22726). RT is funded by a Versus Arthritis PhD Scholarship. The views expressed are those of the author(s) and not necessarily those of the National Health Service, the ROS, or the Department of Health and Social Care.

Meredith Newman¹, Jonathan Room¹, Karen Barker²

¹Physiotherapy Research Unit, Oxford University Hospitals NHS Trust N, Oxford, UK

²NDORMS, Oxford University, Oxford, UK

DEVELOPMENT OF A TRIAL INTERVENTION OF PHYSIOTHERAPY EXERCISE REHABILITATION WITH INTEGRATED SUPPORT FOR EXERCISE ADHERENCE FOR PEOPLE WITH VERTEBRAL FRAGILITY FRACTURES AND BACK PAIN

Background: The Osteoporosis Tailored Exercise Intervention (OPTIN) study is an active two-arm, parallel group, multi-centre randomised controlled trial aiming to evaluate whether adding an exercise adherence intervention to a programme of physiotherapy exercise rehabilitation can benefit outcomes for people with vertebral fragility fracture and back pain.

Objectives: To describe the intervention development procedures and processes and to report on the outcome produced of an integrated, tailored exercise adherence and exercise rehabilitation intervention.

Methods: An intervention mapping approach and the Medical Research Council guidelines for complex interventions were used; considering theoretical frameworks, existing clinical guidelines, settings, materials, research evidence, current practice, expert and patient opinion and training needs. Reporting accorded with the Template for Intervention Description and Rationale (TIDiER) checklist and Consensus of Exercise Reporting Template (CERT).

Results: Treatments were deliverable in UK NHS outpatient settings by physiotherapists either face-to-face and/or online at home via video-call and within commissioning reimbursement costs. Standardised clinician training and patient materials were developed and provided e.g., exercise leaflets and videos, weights, adherence approach materials such as exercise diaries and action plans. The intervention consisted of a 90-minute assessment incorporating a physical assessment, questionnaire plus extended interview to assess exercise capability, opportunity, and motivation. Then up to six 30-minute sessions of progressed exercise rehabilitation over 16-weeks with 60-minutes of time integrated flexibly to deliver at least 3 exercise behaviour-change approaches, tailored to the patient and selected from a standardised pack of 9 approaches by the physiotherapist. The comparator was a 60-minute physiotherapy assessment with up to six sessions of the same progressed exercise rehabilitation over 16-weeks without adherence support.

Discussion: Despite increasing consensus about the value of exercise rehabilitation for people with vertebral fragility fractures, adherence to prescribed exercise is known to be challenging and a critical consideration that affects outcomes of rehabilitation. Whether specific support for exercise adherence and self-management can improve outcomes is unknown.

Conclusions: The OPTIN trial aims to recruit 116 participants across eight NHS hospitals and will provide evidence about the efficacy of integrating exercise adherence approaches with physiotherapy exercise rehabilitation on outcomes including physical function, quality-of-life, fear-of-falling, exercise self-efficacy and adherence.

Trial Registration: ISRCTN 14465704

Mohammed Asiri^{1,2}, Karen Knapp², Jonathan Fulford³, David Strain³

¹Radiology, Taif University, Taif, Saudi Arabia

²Medical imaging, University of Exeter, Exeter, UK

³Medical School, University of Exeter, Exeter, UK

THE CORRELATION BETWEEN BODY MASS INDEX (BMI) AND BONE MINERAL DENSITY (BMD) BY DUAL-ENERGY X-RAY ABSORPTIOMETRY (DXA) AND RADIO FREQUENCY MULTI-SPECTROMETRY (REMS) SCANNERS

Background: Osteoporosis is characterized by decreased bone mineral density (BMD), and increased susceptibility to fractures. Although BMD and body mass index (BMI) have a complex relationship, some studies have shown a correlation when using DXA as the method for BMD assessment. Recently, radiofrequency echographic multi-spectrometry (REMS) has emerged as a novel approach to evaluating bone health with promising validity. However, data assessing the correlation between BMI and osteoporosis using REMS is currently lacking.

Objective: This study aims to investigate the correlation between BMI and BMD at two different anatomical sites, the lumbar spine, and femur, using two distinct methods for determining BMD: DXA and REMS.

Methods: 140 males and females with an average age of 62 ± 10 years were subjected to DXA and REMS scans in the lumbar spine and femur to measure BMD. They underwent the scan at the University of Exeter, Medical imaging department (May 2022 to March 2023). Pearson correlation analysis was used to measure the strength and direction of the relationship between BMI and BMD.

Results: The correlation coefficient in the lumbar spine between BMI and BMD was 0.35 and 0.29 for REMS and DXA respectively. For REMS the correlation between BMD and BMI was 0.56 in the total femur and 0.47 in the neck of the femur (NOF), and for DXA was 0.41 in the total femur, and 0.33 in the NOF.

Discussion: The study found a positive correlation between BMI and BMD in the spine and femur using both scanners. The correlation coefficient between BMI and BMD in the lumbar spine was moderate, whereas a moderate to strong correlation was found in the femur. All four associations were statistically significant, as indicated by the p-values (<0.001).

Conclusion: This study provides evidence of a positive correlation between BMI and BMD in the spine and femur. These findings were consistent across different scanners and were statistically significant.

Ruqayyah Turabi^{1,2}, David Wyatt¹, Stefanny Guerra¹, Matthew DL O'Connell¹, Toslima Khatun³, Saibin A Sageer⁴, Adel Alhazmi⁵, Katie J Sheehan¹

¹Department of Population Health Sciences, School of Life Course and Population Sciences, King's College London, London, UK

²Department of physical therapy, Applied Medical Sciences, Jazan University, Jazan, Saudi Arabia

³Centre for Implementation Science, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK

⁴Department of Orthopaedic, Relief Hospital and Trauma centre, Kerala, India

⁵Department of Orthopaedic, King Fahad Central Hospital, Jazan, Saudi Arabia

BARRIERS AND FACILITATORS OF WEIGHT BEARING AFTER HIP FRACTURE SURGERY AMONG OLDER ADULTS. A SCOPING REVIEW

Background: Although guidelines recommend early full weight bearing (WB) after hip fracture surgery, it is not consistently prescribed or achieved globally due to various factors. Partial WB may be prescribed based on factors such as poor bone quality, perceived risk of implant failure, and differences in healthcare systems. However, there has been no effort to synthesize evidence on barriers and facilitators of full WB after hip fracture surgery.

Purpose: This scoping review aimed to synthesise the available evidence on barriers and facilitators of WB after hip fracture surgery in older adults.

Methods: Published (Cochrane Central, MEDLINE, EMBASE, CINAHL, and PEDro) and unpublished (Global Health, EThOS, WorldCat dissertation and thesis, ClinicalTrials.gov, OpenAIRE, DART-Europe) evidence was identified through electronic searches from database inception to 29th March 2022.

Results: In total, 69 studies (all from published literature sources) detailing 47 barriers and/or facilitators of WB were included. Of barriers/facilitators identified, 27 were patient-, 8 non-surgical process-, 8 surgical process-, and 4 structure-related. Patient facilitators included anticoagulant, home discharge, and aid at discharge. Barriers included preoperative dementia and delirium, postoperative delirium, pressure sores, indoor falls, ventilator dependency, haematocrit<36%, systemic sepsis, and acute renal failure. Non-surgical process facilitators included early surgery, early mobilisation, complete medical co-management, in-hospital rehabilitation, and patient-recorded nurses' notes. Barriers included increased operative time and standardised hip fracture care. Surgical process facilitators favoured intramedullary fixations and arthroplasty over extramedullary fixation. Structure facilitators favoured more recent years and different healthcare systems. Barriers included pre-holiday surgery and admissions in the first quarter of the year.

Discussion: We synthesised 47 factors into patient, process (non-surgical, surgical), and structure barriers/facilitators. These factors were mostly related to patient or surgery. Our findings indicate a paucity of research focusing on non-surgical processes and/or structure barriers/facilitators of WB.

Conclusions: Most patient/surgery-related barriers/facilitators may inform future risk stratification. Future research should examine additional process/structure barriers and facilitators amenable to intervention. Furthermore, patient barriers/facilitators need to be investigated by replicating the studies identified and augmenting them with more specific details on weight bearing outcomes.

Fay Manning¹, Faraz Mughal^{2,3}

¹School of Medicine, University of Exeter, Exeter, UK

²School of Medicine, Keele University, Staffordshire, UK

³Unit of Academic Primary Care, University of Warwick, Warwick, UK

⁴School of Medicine, Royal College of Surgeons, Adliya, Bahrain

⁵Haywood Academic Rheumatology Centre, Midlands Partnership Foundation Trust, Stoke-on-Trent, UK

OSTEOPOROSIS AND FRACTURE AS RISK FACTORS FOR SELF-HARM AND SUICIDE: A SYSTEMATIC REVIEW AND META-ANALYSIS

Background: Previous research examining the risk of self-harm or suicide in older adults with osteoporosis or fractures has yielded conflicting results, possibly due to a lack of consensus on osteoporosis diagnosis, population variations, and study limitations.

Objective: We aimed to investigate whether osteoporosis or fractures are risk factors for self-harm, suicidal ideation, and suicide.

Design: A systematic review of observational studies following PRISMA guidelines was undertaken. Six databases were searched from inception to July 2019. Additional citation tracking of eligible studies was performed in November 2022. Screening, data extraction and quality assessment of full-text articles were performed independently by at least two authors. Where possible, meta-analysis was performed on comparable risk estimates.

Population: Adults with osteoporosis and/or fractures.

Outcome: Self-harm, suicidal ideation, and/or suicide.

Results: Fifteen studies were included, two examined the outcome of self-harm, three suicidal ideation and 10 the outcome of suicide. Osteoporosis related studies were equally set in Europe (3/7) and East Asia (3/7), and studies relating to fractures were predominantly set in East Asia (5/9). In approximately half of the studies examining the association of osteoporosis with risk of suicidal ideation and suicide, the risk was significant. However, pooling of adjusted odds ratios from three studies indicated no association between osteoporosis and suicide (1.14 (95% confidence interval 0.88-1.49)). Nine studies examined the risk of a range of fracture types across a variety of outcomes, limiting comparisons. However, all studies examining vertebral fracture (n=3) reported a significant adjusted positive association for self-harm or suicide. Meta-analysis was not possible with these studies due to each of the papers utilising different risk estimates.

Conclusion: Our meta-analysis found no association between having osteoporosis and subsequent suicide. However, all studies examining the risk in people with vertebral fractures found an increased risk of subsequent self-harm or suicide. Due to the limited number and quality of studies, as well as mixed findings, further examination of these associations is warranted. However, patients with vertebral fractures may benefit from case-finding for mood disorders in primary care, which are risk factors for suicide, and the subsequent management.

Laurina Bullock¹, Ida Bentley², Anne Worrall², Ruth Haines², Clare Jinks¹, Alice Moul¹, Jane Fleming^{3,4}, Emma M Clark⁵, Elaine Nicholls¹, Sarah Leyland⁶, Simon Thomas⁷, Cynthia P Iglesias-Urrutia^{8,9}, Terence W O'Neill^{1,10}, Christian Mallen¹, Zoe Paskins^{1,12}

¹School of Medicine, Keele University, Stoke-on-Trent, UK

²School of Medicine Research User Group, Keele University, Stoke-on-Trent, UK

³Cambridge Public Health, University of Cambridge, Cambridge, UK

⁴Addenbrooke's Hospital Fracture Liaison Service, Cambridge University Hospitals NHS Trust, Cambridge, UK

⁵Bristol Medical School, University of Bristol, Bristol, UK

⁶Royal Osteoporosis Society, (ROS), Bath, UK

⁷Prescribing Decision Support, (PDS), Knutsford, UK

⁸Department of Health Sciences, University of York, York, UK

⁹Danish Centre for Healthcare Improvements, Aalborg University, Aalborg, Denmark

¹⁰Centre for Epidemiology Versus Arthritis, University of Manchester, Manchester, UK

¹¹NIHR Manchester Biomedical Research Centre, Manchester University NHS Foundation Trust, Manchester, UK

¹²Haywood Academic Rheumatology Centre, Staffordshire and Stoke-on-Trent Partnership Trust, Stoke-on-Trent, UK

“THIS IS MY TEAM”: LESSONS LEARNT FROM PATIENT AND PUBLIC INVOLVEMENT IN THE IFRAP STUDY

Background: Patient and Public Involvement (PPI) entails research being carried out ‘with’ or ‘by’ members of the public, rather than ‘to’, ‘about’ or ‘for’ them.

Objective: To demonstrate the impact of collaborating with PPI members throughout the iFraP (The Improving uptake of Fracture Prevention drug Treatments) study, which aimed to codevelop and test an osteoporosis treatment shared decision-making intervention.

Methods: PPI members with osteoporosis and their caregivers participated in iFraP PPI activities through the research cycle, including 20 meetings. Additionally, one PPI member joined the iFraP study team, contributing to monthly study meetings. Meeting notes were collated, with relevant information extracted: i) meeting aim, ii) PPI contributions and challenges, iii) and impacts realised. Extractions were tabulated to identify themes, developed together with the PPI co-authors.

Results: Two themes were identified, with impact cross-cutting intervention and research design: i) holistic person-centred care and ii) equality, diversity and inclusion. PPI members discussed osteoporosis care aside from drug treatments. Fear and worry associated with osteoporosis guided incorporation of a ‘getting support’ component of iFraP intervention. Discussions also impacted research design, with a measure of patient experience (decision-making about medicines) chosen as the trial primary outcome rather than a clinical outcome (e.g. drug adherence). Intervention design (e.g. to facilitate intervention use in remote consultations) and study documents (e.g. data collection instruments) were updated to support accessibility. PPI increased the representativeness of intervention content (e.g. ‘low sex hormones’ rather than ‘menopause’ when considering osteoporosis risk factors). PPI members emphasised the need to support underserved groups to participate in research, with study invites including translation and additional costs acquired for translation services.

Discussion: PPI impact was enabled through a culture of reciprocity and respectful challenge, where trust was built through listening to and valuing contributions. Challenges included providing sufficient, accessible communications, maintaining engagement, and collecting and acting on feedback about PPI activities.

Conclusion: PPI has enhanced inclusivity in the iFraP intervention and research design. We aim to address the challenges identified to maintain and improve the reciprocity of our PPI activities.

Conflicting Interests: This study was funded by the National Institute for Health Research (NIHR) [Clinician Scientist Award (CS-2018-18-ST2-010)/NIHR Academy], the Royal Osteoporosis Society, and the Haywood Rheumatology Research and Development Foundation. This study presents independent research funded by the NIHR. The views expressed are those of the author(s) and not necessarily those of the National

Health Service, the NIHR, or the Department of Health and Social Care. ZP is funded by the NIHR, Clinician Scientist Award (CS-2018-18-ST2-010)/NIHR Academy. TON is supported by the NIHR Manchester Biomedical Research Centre. CM is funded by the NIHR Applied Research Collaboration West Midlands, the NIHR School for Primary Care Research and a NIHR Research Professorship in General Practice (NIHR-RP-2014-04-026). CJ is part funded by NIHR Applied Research Collaboration (ARC) West Midlands.

Laurina Bullock¹, Clare Jinks¹, Jane Fleming^{2,3}, Emma M Clark⁴, Sarah Leyland⁵

¹School of Medicine, Keele University, Stoke-on-Trent, Staffordshire, UK

²Cambridge Public Health, University of Cambridge, Cambridge, UK

³Addenbrooke's Hospital Fracture Liaison Service, Cambridge University Hospitals NHS Trust, Cambridge, UK

⁴Bristol Medical School, Faculty of Health Sciences, University of Bristol, Bristol, UK

⁵Royal Osteoporosis Society, Bath, UK

⁶Centre for Health and Development, Staffordshire University, Leek Road, Stoke-on-Trent, Staffordshire, UK

⁷Department of Health Sciences, University of York, York, UK

⁸Danish Centre for Healthcare Improvements (CHI), Aalborg University, Denmark

⁹Centre for Epidemiology Versus Arthritis, University of Manchester, UK

¹⁰NIHR Manchester Biomedical Research Centre, Manchester University NHS Foundation Trust, Manchester, UK

¹¹Haywood Academic Rheumatology Centre, Staffordshire and Stoke-on-Trent Partnership Trust, Stoke-on-Trent, UK

PATIENT INTERACTION IN UK FRACTURE LIAISON SERVICES: RESULTS FROM THE IFRAP NATIONAL SURVEY

Background: Fracture Liaison Services (FLSs) are advocated to promote fracture prevention. Although the FLS model of care has been shown to increase osteoporosis medication uptake, UK national audit data shows only 23% of FLS patients recommended osteoporosis medication report adherence 12 months after fracture. Greater patient involvement in decision-making has potential to increase commitment to osteoporosis medications. Available data, however, do not provide insight into the extent of patient interaction in FLS consultations, such as *how* clinical information is gathered or *how* drug recommendations are made. *Objective:* to identify the nature and extent of patient interaction in FLS consultations and how the pandemic affected these.

Methods: Practitioners working in any UK FLS were eligible to participate in a national eSurvey, disseminated via national audit and charity newsletters and mailing lists, social media, and study team networks. Participants were asked about their interaction with patients at each stage of the FLS care pathway, before and during the COVID pandemic.

Results: Data were collected between October 2020 and January 2021. Forty-six eligible practitioners completed or partially completed the eSurvey, representing 39 FLSs (secondary care 82%, n=32; England 79%, n=31), over half of all 74 FLSs reporting to FLS-database. Half (50%, n=18/36) completed clinical assessments face-to-face for all patients, with 28% (n=10/36) undertaking such assessments for some, while 22% (n=8/36) reported no face-to-face assessments. In services who responded to questions about osteoporosis drugs, one-third (11/34) reported not explaining osteoporosis medications to patients and instead making recommendation direct to GPs or other non-primary care professionals.

The majority of services (88%, n=28/32) reported that the extent of face-to-face consults during COVID was affected, with three-quarters (75%, n=24/32) reporting likely long-term impacts on face-to-face consults beyond COVID.

Discussion: There was important variation across FLSs with respect to the nature and extent of patient contact. The COVID pandemic was the driver of further service change and variation.

Conclusion: This national survey has identified possible contributory explanations to lower osteoporosis medicine uptake, with many FLSs not discussing medicines with patients, missing an opportunity for shared decision-making with a specialist service.

Conflicting Interest: This study was funded by the National Institute for Health Research (NIHR) [Clinician Scientist Award (CS-2018-18-ST2-010)/NIHR Academy], the Royal Osteoporosis Society, and the Haywood Rheumatology Research and Development Foundation. This study presents independent research funded by the NIHR. The views expressed are those of the author(s) and not necessarily those of the National Health Service, the NIHR, or the Department of Health and Social Care. ZP is funded by the NIHR, Clinician

Scientist Award (CS-2018-18-ST2-010)/NIHR Academy. TON is supported by the NIHR Manchester Biomedical Research Centre. CM is funded by the NIHR Applied Research Collaboration West Midlands, the NIHR School for Primary Care Research and a NIHR Research Professorship in General Practice (NIHR-RP-2014-04-026). CJ is part funded by NIHR Applied Research Collaboration (ARC) West Midlands.

Final Poster Number: P57

Maria Talla¹, Margaret French¹, Kay Johnstone¹, Angela Collie¹, Leigh Robertson¹, Mayrine Fraser¹, Kevin Milne², Gavin Glen³, Claire Cutt³, Alastair Robertson⁴, Pamela Fergusson⁴, Annie Sinclair⁵, Andrew Conkie⁵

¹Department of Endocrinology and Bone Metabolism, Queen Elizabeth University Hospital, NHS Greater Glasgow & Clyde, Glasgow, UK

²Clinical Research & Development, West of Scotland Safe Haven, Glasgow, UK

³Integration Team, NHS National Services Scotland, Glasgow, UK

⁴West of Scotland Innovation Team, NHS Greater Glasgow & Clyde, Glasgow, UK

⁵RedStar, Glasgow, UK

REDSTAR FLS – AN INNOVATIVE DIGITAL SOLUTION FOR FRACTURE LIAISON SERVICES IN NHS GREATER GLASGOW AND CLYDE

Background: The risk of a second fragility fracture is highest within the first 12-24 months following an index fracture. Secondary prevention of osteoporotic fractures requires an effective Fracture Liaison Service (FLS).

Objective: We sought to design an innovative digital solution to facilitate early identification of fractures through our radiology reporting system, and present this information to the clinician alongside other data relevant to FLS.

Methods: A text-based approach was deployed into the Cris Radiology Information System to identify radiology reports which meet pre-specified criteria for FLS. This algorithm runs daily, generating a list of unique patient identifiers which are then linked with biochemistry and historical radiology data from the Scottish Care Information (SCI) Store, alongside prescribing and bone densitometry data from the Safe Haven. This information is processed by the RedStar FLS application and displayed on a clinician dashboard. The data on the dashboard is assessed and actioned daily, generating an individualised care plan for each patient which may include a recommendation for treatment, bone densitometry, biochemical investigations, or further assessment at the clinic.

Results: We demonstrated a reduction in time to identification of vertebral fractures from 18 months down to 48 hours, with the average time to creation of a care plan of 12 hours. In terms of the number of patients with vertebral fractures identified compared to the predicted number based on the FLS-DB matrix, our automated audit tool shows that we are performing at 185%, and for all fragility fractures it is 124%. Electronic document transfer to Primary Care has resulted in an administrative time-saving of 28 hours per week.

Conclusion: The RedStar FLS system has introduced simplicity in combining multiple eHealth screens into a single screen with targeted radiology, laboratory and prescribing information. We have increased the number of patients identified and treated with the same clinical resource. Given the short time to identification of fragility fractures, we are able to take a targeted approach to prioritise patients at very high fracture risk for bone densitometry and assessment.

Christina Heaton

¹Falls & Bone Health, Wrightington, Wigan & Leigh Teaching NHS trust, Wigan, Greater Manchester, UK

²University of Salford, Salford, Greater Manchester, UK

IMPACTS OF AN ETHNOGRAPHIC STUDY OF EXPERIENCES OF FALLS IN DOMESTIC SETTINGS AND THE USE OF AMBULANCE SERVICES

Objectives: The study aimed to gain an in-depth understanding of the patients' journey following a fall, from patients and ambulance crew perspectives.

Methods: A critical ethnographic approach enabled participants' values, behaviors and beliefs to be explored. The methods were participatory observation, semi-structured interviews, and in-depth field notes. The findings were thematically analysed, and narrative used to add meaning to their experience.

Results: The study gained an in-depth understanding of the experiences of crew and patients. For both ambulance crew and patients, there were two shared themes '*falls journey*' & '*falls not being acknowledged as a problem for patients*'. For crew '*training*' was a theme and for patients' '*language*' and '*Patient transport*' were also themes.

Discussion: The study shared the challenges of recruiting in a hard-to-reach group. The findings from the study identified areas that required development and further research.

Impacts from practice recommendations: Raise public awareness and understanding of falls risk

The findings and knowledge generated from this study have influenced and contributed to the change of policy and practice. This has also had a cultural and social impact in supporting the development of a borough wide Strategy for the Prevention and Management of Falls and Bone Health, which aims to provide timely, coordinated, effective evidenced based assessment and interventions. Provide crew falls training

The local falls pathway was established in 2011, audit findings in 2015 found 42% of patients seen following a fall were referred to the falls services. All local crew were provided training following the study in 2020 with positive feedback received. A reaudit later in 2020 found 84% of patients seen were referred. Provide an urgent lifting service

This has been explored and my findings shared across the local area to support funding opportunities, which was unsuccessful. However, a pilot lifting service has now been commenced with our Community React Team and Ambulance Service, this is in the early stages and findings are yet to be published. *Key words:*

Falls prevention, ambulance, patients & crew perspective, Bone Health

Conflicting Interest: I am now a member of the NICE committee for Falls in Older People and A Senior Research leader on NIHR programme 23-26

Final Poster Number: P59

Tanzeela Khalid¹, **Clare Shere**¹, Imran Shahriar², Emma M Clark¹

¹Musculoskeletal Research Unit, University of Bristol, Bristol, UK

²Southmead Hospital, North Bristol NHS Trust, Bristol, UK

REMOTE VERSUS FACE TO FACE USE OF A CLINICAL DECISION TOOL TO HELP IDENTIFY CURRENT RISK OF OSTEOPOROTIC VERTEBRAL FRACTURE IN MEN WITH BACK PAIN

Background: Approximately 12% of older adults have an osteoporotic vertebral fracture (OVF), but currently fewer than one-third are diagnosed, potentially limiting access to bone protection treatment. Vfrac is a vertebral fracture screening tool consisting of 15 questions (self reported data and physical examination). The tool sorts individuals into high or low risk of having an OVF, to recommend spinal radiograph in high-risk individuals. Implementing Vfrac remotely through self-completion at home could reduce the burden on primary care services of providing face-to-face assessments of back pain, with home-completed Vfrac as a decision tool for performing a spinal radiograph.

Objective: To assess the agreement between self-completion at home versus face-to-face (F2F) use of Vfrac in men.

Methods: We recruited men aged over 65 years with a spinal radiograph in the previous 3-6 months. Participants completed the Vfrac assessment at home, and then attended a research clinic to complete the Vfrac assessment F2F with a research nurse. We assessed agreement of the home completed and F2F completed Vfrac results using Cohen's kappa.

Results: 47 men with a mean age of 76 years completed Vfrac at home and F2F. Home completed Vfrac identified 14.9% as high risk of having an OVF, whereas F2F completed Vfrac identified 4.3% as high risk ($p=0.001$). There was overall moderate agreement (kappa 0.41, 95% CI 0.17, 0.63) between home completed and F2F completed Vfrac. 19.2% of men preferred home completion, 36.2% preferred F2F completion, and 44.7% had no preference.

Discussion: These results show moderate agreement between home completed and F2F completed Vfrac in men. The study was limited by high drop out, with a considerable number of individuals not attending a F2F visit.

Conclusion: Use of a remote clinical decision tool for recommendation of spinal radiograph to improve OVF detection is promising. However, further work is needed to determine whether remote use is reliable and acceptable to patients.

Abayomi Ajewole¹, Katie Brittain¹, Stephen Tuck^{2,3}, Siân Russell¹

¹Population Health Sciences Institute, Newcastle University, Newcastle upon Tyne, UK

²Institute of Cellular Medicine, Newcastle University, Newcastle upon Tyne, UK

³Department of Rheumatology, James Cook University Hospital, Middlesbrough, UK

OSTEOPOROSIS: WHAT DO MEN KNOW? A SYSTEMATIC REVIEW AND EVIDENCE SYNTHESIS

Background: Osteoporosis is a bone disorder characterised by a systemic impairment of bone mass, strength, and microarchitecture, which increases the risk of fragility fractures. It is the most prevalent bone disease in humans, and it is more prevalent in Caucasians, women, and older people and poses a threat to public health. It is expected to become more common as the population ages and affects a vast number of people of all sexes and races. In contrast to women, osteoporosis in men has received relatively little attention.

Objective: To synthesise men's knowledge and experience of osteoporosis and compare it with women's knowledge and experience.

Methods: The databases searched for this systematic review included Ovid Medline, Embase, Web of Science, Scopus, PsycINFO, CINAHL, and ProQuest's Social Science Premium Collection. Qualitative studies that included men aged 17 years and over were retrieved using the search terms such as osteoporosis, fragility or low-trauma fracture, bone health, men, male, knowledge, understanding, and experiences. The included studies were appraised for the quality of data and thematic synthesis was used to synthesise the findings.

Results: Nine publications based on eight studies were identified. With an age ranging from 17 to 99 years old, 124 women and 172 men were interviewed for the eight studies. Three themes were developed from the synthesis: (1) Gender, a lens through which men know osteoporosis; (2) Inadequate and misleading information; and (3) Knowledge of severity and risk taking behaviour.

Conclusion: The clear gender viewpoint of osteoporosis, which is characterised as a female disease by both men and women, healthcare professionals, and society at large, was one of the important findings of this qualitative evidence synthesis and this has a substantial impact on the investigation, diagnosis, and treatment of osteoporosis in men. Information materials should reflect that osteoporosis does affect men as well as women, and the information might need to be altered to reflect the lack of understanding about male osteoporosis, as this will help in bridging the knowledge gap.

Yang Li¹, Cheng-Hung Lee¹, Shih-Yi Lin²

¹Department of Orthopedics, Taichung Veterans General Hospital, Taichung, Taiwan

²Division of Endocrinology and Metabolism, Taichung Veterans General Hospital, Taichung, Taiwan

CO-MANAGED CARE PROTOCOL FOR ELDERLY PATIENTS WITH HIP FRACTURES: EARLY OSTEOPOROSIS TREATMENT AND REDUCED LONG-TERM COSTS

Background: Hip fractures in elderly patients are a significant public health concern, with high mortality rates and associated medical costs. Osteoporosis, a common underlying condition, increases the risk of hip fracture. Early diagnosis and treatment of osteoporosis can reduce the risk of future fractures. *Objective:* This study aimed to evaluate the impact of a multidisciplinary co-managed care protocol on the outcomes and long-term medical costs in elderly population with proximal femur fractures, with a focus on early osteoporosis treatment and diagnosis.

Methods: The study analyzed data from 357 elderly patients with hip fractures, who received treatment under either a co-managed care protocol or standard care. The co-managed care protocol integrated early assessment of osteoporosis risk and prompt treatment with anti-osteoporosis medication. The study evaluated the overall effectiveness of protocol on shortening the treatment gap for osteoporosis and its impact on patients' long-term clinical outcome, medical expenditures, mortality rates, and re-fracture rates.

Results: The implementation of the co-managed care protocol has significantly increased the coverage of anti-osteoporosis agent in patient population with osteoporotic fractures. Although the benefit from higher prescription rate of anti-osteoporosis medication was not reflected by a significantly reduced re-fracture rate in the protocol group, the association between early prescription of anti-osteoporosis medication and reduced long-term overall medical expenses has provided a future direction for further research.

Discussion: The findings of this study suggest that implementing a multidisciplinary co-managed care protocol for geriatric proximal femur fractures reduces the treatment gap for osteoporosis without generation of extra medical burden on healthcare systems. Although without significance, early diagnosis and treatment of osteoporosis associated with a reduced re-fracture rate and long-term medical expense despite pre-prescription of antiosteoporosis agents.

Conclusion: The implementation of a co-managed care protocol for elderly patients with hip fractures leads to early diagnosis and treatment of osteoporosis. This approach has the potential to improve outcomes, reduce medical costs, and alleviate the medical burden of hip osteoporotic fractures on healthcare systems. Further research is needed to determine the impact of early osteoporosis treatment and to optimize the co-managed care protocol for this patient population.

Nataliya Gak^{1,4}, Ali Abbara², Judith Bubbear¹, Alexander Comninos³, Richard Keen¹

¹Rheumatology, Royal National Orthopaedic Hospital NHS Trust, London, UK

²Endocrinology, Imperial College, London, UK

³Endocrine Bone Unit, Imperial College Healthcare NHS Trust, London, UK

⁴Metabolism, Digestion and Reproduction, Imperial College, London, UK

WOMEN'S EXPERIENCE OF LIVING WITH PREGNANCY AND LACTATION ASSOCIATED OSTEOPOROSIS IN THE UNITED KINGDOM - A QUALITATIVE INTERVIEW STUDY

Background: Pregnancy and lactation associated osteoporosis (PLO) is a rare and severe form of osteoporosis defined by a reduction in bone mineral density leading to fragility fractures during the last trimester of pregnancy or post-partum when lactating. Despite the severe physical and psychosocial consequences of fracturing around pregnancy, there are currently no data in this regard investigating patients with PLO in the UK.

Objectives: To determine the impact of PLO on physical, emotional, and social wellbeing of women with PLO.

Methods: 15 women (age range 32-60 years, mean 40 years) who attended specialist tertiary clinics in the UK, were recruited to take part in semi- structured interviews (duration from diagnosis to interview range 1-32 years, median 3 years). The interviews were video recorded, transcribed verbatim and qualitative data was analysed using emergent coding and thematic analysis.

Results: The main themes that emerged were: 1) lack of awareness about PLO in primary and secondary care leading to delays in diagnosis, misdiagnosis and incorrect management; 2) lack of physiotherapy and psychological support specific to PLO needs; 3) acute and chronic back pain impacting on mobility, ability to self-care and care for new-born, resulting in dependence on others (partners, parents, baby-sitters, friends); 4) grieving for the loss of motherhood, self-identity and life normality; 5) anxiety about further possible fractures and future pregnancies; 6) struggling to engaged in social activities important to wellbeing due to mobility issues, loss of self-confidence and emotional distress caused by the diagnosis of PLO.

Conclusion: These data demonstrate the physical, and psychosocial impacts of PLO in women in the UK for the first time. They describe a noticeable lack of understanding about PLO and its management in the UK. Better awareness with faster diagnosis and subsequent timely treatment may partially alleviate some of the physical and psychosocial impacts. The themes identified suggest that a multidisciplinary approach with early the involvement of obstetricians, midwives, metabolic bone specialists, spinal surgeons, pain specialists, physiotherapists, and psychologists may better address the needs of women affected by PLO.

Anup Pradhan, Elaine Nicholls, John Edwards, Victoria Welsh, Zoe Paskins

¹School of Medicine, Keele University, Keele, UK

BONE HEALTH ASSESSMENT IN MEN AND WOMEN WITH RISK FACTORS FOR FRAGILITY FRACTURES

Background: Osteoporosis is commonly known to affect post-menopausal women with fragility fractures seen in one in two women. However, this condition also affects men with one in five men over the age of fifty years expected to sustain a fragility fracture during their lifetime (NICE 2018). Identifying all patients at risk of fragility fractures can facilitate early intervention.

Objective: To explore if bone health assessment (BHA) rates differ between women and men aged 50 years and over with one or more fragility fracture risk factors: those who have sustained fragility fractures, falls and taking steroids for three months or more.

Methods: Using the Consultations in Primary Care Archive (CiPCA) database, a retrospective cohort was conducted. Patients aged 50 years and over who presented with a fracture, fall or who were taking prednisolone for three months or more within the study period of January 1st, 2002 and December 31st, 2014 were identified. These patients were evaluated to see whether a BHA was carried out within twelve months of recording of risk factor. Evidence of a BHA was defined with documentation of codes for a fragility fracture assessment tool (FRAX/QFracture), bone density measurement/osteoporosis, specialist service referral, or if bone protection medication was started. Chi-squared test was used to analyse an association between BHA and patient sex while multivariable logistic regression analysis was used to adjust for other covariates.

Results: Of the 15,581 patients identified in the study period, 1172 patients (7.5%) had evidence of BHA within one year of presentation. Significantly more females (8.9%) than males (5.5%) underwent BHA ($X^2 = 59.88$, $p < 0.0001$). This relationship prevailed after adjustment for other covariates such as co-morbidity and number of consultations, with an odds ratio of 1.25 (95% Confidence Interval 1.08-1.43).

Discussion: This study has highlighted that BHA in at-risk patients is low and under-recorded in men and women, and that women are more likely to have a BHA compared to men with an increase in odds around 25%.

Conclusion: Primary care clinicians should be alert to fragility fracture risk factors in both men and women to enable early assessment and intervention.

Wei Chee Lee¹, Zoe Syrimi², Kiran Putchakayala²

¹Department of Medicine, Manchester University, Manchester, UK

²Department of Rheumatology, Mid Cheshire Hospitals NHS Foundation Trust, Crewe, UK

OSTEOPOROSIS IN MEN: RISK FACTORS AND INDICATIONS FOR PARENTERAL TREATMENT

Background: Osteoporosis in men is often overlooked by clinicians as it affects less men than women. However, the proportion of men with osteoporosis and osteopenia relative to the whole population is still substantial. The poorer awareness and understanding of osteoporosis in men leads to underscreening, underdiagnosis and undertreatment.

Objective: To describe the risk factors for osteoporosis and the indications for parenteral treatment in male patients at a secondary care rheumatology department.

Methods: Patients were identified using the department's electronic patient monitoring system and pharmacy lists. Patient demographics and information on diagnosis, risk factors, fracture history and treatment indications were obtained from electronic records.

Results: 13% of patients receiving parenteral osteoporosis treatments were male (n=24). Age range was from 27 to 86 years. 15 patients had osteoporosis and 8 had osteopaenia. 20 patients were receiving zoledronic acid and 4 were receiving denosumab. Risk factors included long term steroid use (n=9), family history (n=2), primary hypogonadism (n=1), ankylosing spondylitis (n=1), androgen deprivation therapy (n=1), anti-epileptic medication (n=1) and alcohol excess (n=1). Reasons for using zoledronic acid included oesophageal disorders (n=9), severe osteoporosis (n=4), high FRAX score (n=3), treatment failure on oral bisphosphonates (n=2) and compliance issues with oral bisphosphates (n=2). Denosumab was used in all patients due to renal impairment. 10 patients had a previous fracture and half of these had a known risk factor for osteoporosis. Of those without a known risk factor, 4 out of 5 were aged under 75 years. No new fractures were reported in all 24 patients on parenteral treatments.

Discussion: Given the high proportion of secondary osteoporosis in males, men should be thoroughly investigated for a secondary cause. While fracture risk assessment is recommended for all men aged 75 years and over and men aged under 75 years in the presence of risk factors, it may be that we are still missing a significant proportion of male patients that would benefit from fracture risk assessment and osteoporosis treatments.

Conclusion: In our study, over half of male patients had a secondary cause for their osteoporosis or osteopaenia. The most common indication for using zoledronic acid was oesophageal disorders and for denosumab was renal impairment.

Abdulkareem Algahtani, Karen Knapp, Robert Meertens, Jon Fulford, David Strain

¹Medical Imaging, University of Exeter, Exeter, UK

²Radiology Technology, Taibah University, Almadinah Almonawarah, Saudi Arabia

SHORT-TERM PRECISION ERRORS OF DENSITY INDEX MEASUREMENTS AT THE PROXIMAL TIBIA USING THE BINDEX[®] SCANNER

Introduction: The Bindex[®] system utilises a novel ultrasound method that calculates a bone density index by measuring the thickness of cortical bone at peripheral skeletal sites with a handheld device. This study aimed to assess the short-term intra-operator precision of the Bindex[®] for measurements of the proximal tibia.

Methods: Fifteen participants (13 male & 2 female, age mean \pm sd 35.9 \pm 7.6 years) were included in the study. All participants underwent three scans with the Bindex[®] device in the same session with repositioning between each scan. In all scans, the thickness of cortical bone at the proximal tibia was measured according to manufacturer's instructions and by the same investigator. The data were analysed using the root mean square standard deviation (RMSSD) and the root mean square coefficient of variation (RMSCV%), as recommended by the international society for clinical densitometry (ISCD) [1].

Results: For the bone density index score, based on scans at the proximal tibia, RMSSD was 0.019g/cm² and RMSCV% was 1.73%.

Conclusion: The precision error rates in this study were higher than, but in line with, the Behrens et al, 2016 study [2]. Further studies are required to investigate the medium and long-term precision errors of Bindex[®], as well as inter-operator precision results.

Limitation: All participants in this study were scanned by one operator.

Ethics committee: College of Medicine and Health research ethics committee at University of Exeter were approved for this study (21/05/285)

Conflicting Interests: University of Exeter

Tim Holt^{1,2}, May Ee Png¹, Margaret Smith¹, Gary Collins³, Stavros Petrou¹, Felix Achana¹, Jan Roast⁴, Valeria Frighi²

¹Nuffield Department of Primary Care Health Sciences, Oxford University, Oxford, UK

²Department of Psychiatry, Oxford University, Oxford, UK

³Centre for Statistics in Medicine, Oxford University, Oxford, UK

⁴Patient representative, Oxford University, Oxford, UK

COST-EFFECTIVENESS OF OSTEOPOROTIC FRACTURE RISK ASSESSMENT IN PEOPLE WITH INTELLECTUAL DISABILITIES

Background: People with intellectual disability (ID) are at substantially greater risk of major osteoporotic fracture (MOF), particularly hip fracture (HF) and develop such fractures 15-25 years earlier than the general population. Current policy does not recommend risk assessment for most people until older age. A new risk score, IDFracture, is specifically tailored to the ID population.

Objective: We compared the cost-effectiveness of three alternative strategies for addressing this problem in primary care.

Methods: We first validated the IDFracture score, using a new database. We then developed a decision tree with a Markov cohort model to compare three strategies: 1. Current policy, in which individuals are risk assessed before age 65 years (women) and 75 years (men) if they have a risk factor for osteoporosis, otherwise from these ages, using the recommended QFracture risk score; 2. Assessment of all over 40 years using IDFracture; and 3. Conducting a one-off bone mineral density scan (DXA) on all from age 40 years. In strategies 1 and 2, those found with risk of MOF above 10% and/or HF above 3% over ten years would be offered DXA. For all strategies, DXA findings would lead to the appropriate preventative intervention. We estimated discounted direct healthcare costs and quality-adjusted life-years, to derive incremental cost-effectiveness ratios for each strategy. We included subgroup analyses in three age groups: 40-49 years; 50-65/75 years (female/male), and over 65/75 years.

Results: The IDFracture score performed well in our validation data. Strategy 2 was cost-effective compared with strategy 1 (current policy) for all age groups. For those over 50 years, strategy 3 was also cost-effective compared with strategy 1.

Discussion: Our study was limited in that outcomes were confined to health care costs, excluding the high non-health care costs that can result from fractures in this population. The overall societal cost of preventable fractures may therefore have been under-estimated through this conservative approach.

Conclusion: Policy change over the assessment of bone health in people with ID, which could be included in the statutory annual health check in general practice, could confer substantial benefit to this vulnerable population, and would be cost effective.

Barbara Hauser^{1,2}, Pollie Ravji¹, Morven McRorie², Kathryn Berg², Stuart H Ralston^{1,2}

¹Rheumatic Disease Unit, NHS Lothian, Edinburgh, UK

²Rheumatology and Bone Disease Unit, Centre for Genomic and Experimental Medicine, University of Edinburgh, Edinburgh, UK

FRACTURE RISK IS SIGNIFICANTLY ASSOCIATED WITH CARDIOVASCULAR RISK IN PATIENTS WHO QUALIFY FOR ROMOSUZUMAB TREATMENT

Introduction: Romosozumab is a newly licensed osteoporosis (OP) treatment for patients at very high fracture risk. Cardiovascular safety concerns were raised from a post-hoc analysis of a pivotal study (ARCH)¹ which detected a numerical increased rate of major cardiovascular (CV) events in the Romosozumab group when compared to the Alendronate group².

Objective: Our aim was to analyse baseline cardiovascular risk of patients who were started on Romosozumab and to analyse whether increased cardiovascular risk correlates with elevated fracture risk.

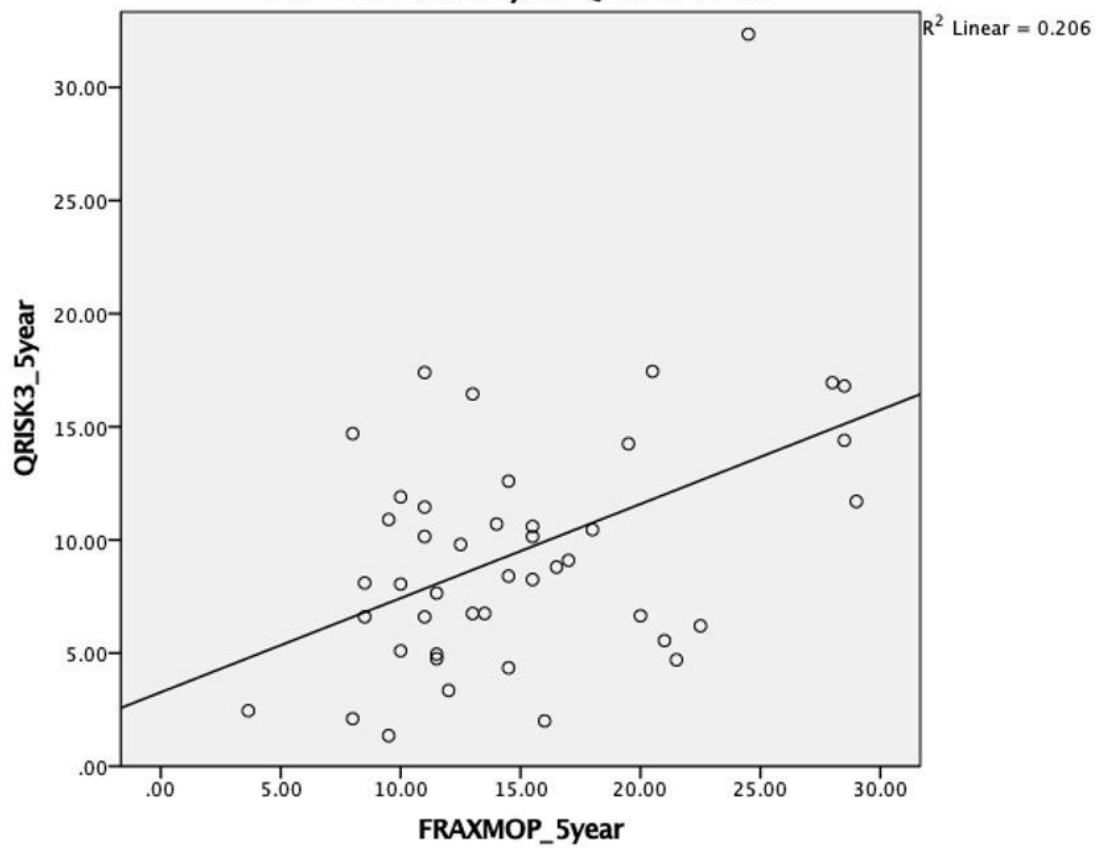
Methods: Retrospective single-centre analysis of patients who have qualified for Romosozumab according to SIGN guidance between February 2021 and November 2022. Major osteoporotic (MOP) and hip fracture risk was calculated with the BMD adjusted FRAX® tool. Cardiovascular risk was assessed with QRISK3®.

Results: Out of 56 patients who have been offered Romosozumab, all patients were postmenopausal women with an average age of 73.1±9.7 years and BMI of 24.4±7.1 kg/m². The baseline 5-year fracture risk was 16.1% ± 6.8% for MOP fractures and 8.9 ± 7.4% for hip fractures. The baseline 5-year cardiovascular risk was 9.8 ± 5.9%. The most common cardiovascular risk factors were hypertension (25%), history of smoking (21.4%), current smoking (14.3%), RA or SLE (10%) and Cholesterol/HDL ratio >4.0 (9.1%). The mean baseline systolic blood pressure was 151.9±18.5 mmHg. Pearson correlation analysis showed a significant positive relationship between MOP fracture risk and cardiovascular risk ($r= 0.45$; $p=0.002$) as shown in Figure 1.

Conclusion: Patients who were offered romosozumab had a high fracture risk but also had a high cardiovascular risk. Given the substantial benefits of romosozumab on fracture risk reduction (approximately 40%) and relatively small increase in CV risk (approximately 1%) we do not think that an arbitrary cardiovascular cut off should be used to exclude patients from treatment. Prescribing physicians should however, assess and treat modifiable CV risk factors such as hypertension, smoking and hypercholesterolaemia.

Conflicting Interests: Prof. Stuart Ralston reports research grants to his institution from Kyowa Kirin, AstraZeneca; donations of investigational medicinal products from Eli Lilly and Novartis to his institution for clinical trials; financial support to his institution for educational events from Pfizer, Abbvie, Kyowa Kirin, Alexion, Amgen, Cellgene, Bristol Myers Squibb, Janssen-Cilag, Novartis, Eli Lilly, Thornton & Ross, AstraZeneca, Sanofi Genzyme, Sandoz, and Roche; and financial support to his institution for consultancy work from UCB, all outside the submitted work. Dr. Hauser reports research grants to her institution from Novartis and consultancy fees from UCB outside the submitted work.

Figure1 Scatter plot showing relationship between 5-year FRAX MOP risk and 5-year QRISK3 score



Kendall Wu¹, Sanskriti Manoharan², Justin Li¹

¹Math and Science Academy, Dulles High School, Sugar Land, USA

²Medical Science Academy, Hightower High School, Missouri City, USA

BIOELECTRICAL IMPEDANCE ANALYSIS AS A NOVEL, ACCESSIBLE METHOD TO DIAGNOSE OSTEOPOROSIS

Background: Osteoporosis is an extremely common and asymptomatic bone-weakening disease that makes affected individuals highly susceptible to fractures. However, diagnosis is expensive and inaccessible, as the current diagnostic test, the DEXA scan, is only conducted in clinical settings. As a result, the vast majority of affected individuals fracture a bone before knowing they have the disease.

Objective: This study proposes reengineering bioelectrical impedance analysis (BIA) as a rapid, low-cost, and accessible alternative to quantify bone mineral density (BMD) and detect osteoporosis.

Methods: First, we verified the correlation between BMD and impedance through hydroxyapatite phantoms and found a linear correlation ($R^2 = 0.75$, $p\text{-value} = 0.06$). Following this, we created several composite phantoms to mimic the electrical properties of human tissue, which consisted of dissolved bovine femur segments placed in concentric cylinders of fat and muscle gels of varying diameters, reflecting both the natural variations in bone density and muscle-to-fat proportions for the standard human population. We then rendered a multidimensional linear model to represent BMD as a function of several electrical properties (e.g., inductance, capacitance, resistance, phase angle, frequency) characteristic of the respective tissues and their proportions, the traditional technique used for fat analysis BIA. By using t-scores, we converted our quantitative bone density data into classifications of either osteoporotic, osteopenic, or healthy samples.

Results: Training different machine learning models on our data, we found that our model had an accuracy of 82% and an AUC ROC score of 0.96 with a decision tree algorithm.

Discussion: These promising findings support an effective, accessible alternative to diagnosing osteoporosis. However, further non-invasive clinical trials should be completed to validate our findings in the context of the human body and increase the data available for algorithm training. We ultimately aim to incorporate this algorithm into a handheld device that takes in body-wide impedance and demographics to identify those at risk of osteoporosis.

Conclusion: BIA has the potential to be implemented as a cheap and portable method of diagnosing osteoporosis.

Pollie Ravji¹, Morven McRorie², Kathryn Berg², Stuart H Ralston^{1,2}, **Barbara Hauser^{1,2}**

¹Rheumatic Disease Unit, Western General Hospital, NHS Lothian, Edinburgh, UK

²Rheumatology and Bone Disease Unit, Centre for Genomic and Experimental Medicine, MRC institute of Genetics and Molecular Medicine, University of Edinburgh, Edinburgh, UK

PRIOR ANTIRESORPTIVE TREATMENT REDUCES LUMBAR SPINE BMD RESPONSE TO ROMOSUZUMAB IN CAUCASIAN POSTMENOPAUSAL WOMEN WITH SEVERE OSTEOPOROSIS

Introduction: Romosozumab is a newly licensed dual-acting osteoporosis (OP) treatment for patients at very high fracture risk. Most patients included in the pivotal trials were treatment naïve.
Objectives: To analyse BMD treatment response to Romosozumab in a real world cohort and to explore whether pre-treatment with antiresorptive osteoporosis medication (OPTx) influences the response at any BMD sites.

Methods: Retrospective single-centre analysis of patients who have completed a 12-month course of Romosozumab between February 2021 and November 2022. BMD assessment was usually performed at baseline and after treatment completion.

Results: Out of 56 patients who have been offered Romosozumab, 47 patients completed the full course of treatment. Four patients decided against starting Romosozumab, two patients developed side effects, two patients died (unknown cause) and one patient was lost to follow up. All patients were postmenopausal women with an average age of 73.1±9.7 years and baseline 10% major osteoporotic fracture risk was 32.2±13.5%. Mean baseline BMD T-score for lumbar spine (LS) was -3.8±1.0 and -3.0 ± 0.7 for total hip (TH). 31(66%) patients were treatment naïve or had recent antiresorptive treatment for less than 6 months, the remainder of patients received recently mostly oral or parenteral bisphosphonate treatment. After 12 months the overall mean % change BMD at the LS was 14.1±9.4 and 5.7±5.6 at the TH site. Spine BMD increase was significantly higher in treatment naïve patients than in patients who had previous OPTx over 6 months (17.3±9.0 vs 7.6±6.9; p<0.01). Prior OPTx however did not seem to influence TH BMD response to Romosozumab (5.1±6.3 vs 6.1±5.1 Txnaive). Age (r=-.37 p<.05; Spearman's rho) and prior OPTx (r= -.49 p<0.01) are inversely related to LS BMD increase. Multivariate regression analysis including age, baseline spine BMD and prior OPTx identified prior OPTx as independent predictor (betaSt= 0.422;p<0.05) of spine BMD response to Romosozumab treatment.
Conclusions: The overall BMD response at LS and TH site after 12 months Romosozumab treatment in real world is similar to that reported in the ARCH trial. Pre-treatment with antiresorptive treatment seems to significantly dampen the BMD response at the lumbar spine, which highlights the importance of the choice of OPTx sequence.

Conflicting Interests: Prof. Stuart Ralston reports research grants to his institution from Kyowa Kirin, AstraZeneca; donations of investigational medicinal products from Eli Lilly and Novartis to his institution for clinical trials; financial support to his institution for educational events from Pfizer, Abbvie, Kyowa Kirin, Alexion, Amgen, Cellgene, Bristol Myers Squibb, Janssen-Cilag, Novartis, Eli Lilly, Thornton & Ross, AstraZeneca, Sanofi Genzyme, Sandoz, and Roche; and financial support to his institution for consultancy work from UCB, all outside the submitted work. Dr. Hauser reports research grants to her institution from Novartis and consultancy fees from UCB outside the submitted work.

Final Poster Number: P70

Jessica Margaux Mercado¹, Katrina Marie Mendoza¹, Jayrick Aguirre¹, Monica Therese Cating-Cabral^{1,2}, Maria Jocelyn Isidro^{1,2}

¹Internal Medicine, Makati Medical Center, Makati, Philippines

²Endocrinology, Makati Medical Center, Makati, Philippines

IS POOR GLYCEMIC CONTROL A RISK FACTOR FOR THE DEVELOPMENT OF OSTEOPOROSIS IN TYPE 2 DIABETES MELLITUS?: A CROSS-SECTIONAL STUDY

Background/Objectives: This study aimed to determine the relationship between poor glycemic control and the risk of osteoporosis in patients with Type 2 Diabetes Mellitus in a private tertiary hospital.

Methods: The charts of 171 T2DM patients who underwent bone densitometry (BMD) were reviewed and the risk of osteoporosis was determined with the exposure of interest being poor glycemic control. Statistical analysis was performed via Wilcoxon-Mann-Whitney Test, Chi-square Test or Fischer's Exact Test, Simple logistic regression, Multiple logistic regression, and Stepwise Regression.

Results/Discussion: From a study population of 171, 48 (28.07%) had osteoporosis. Poor glycemic control was not a risk factor in the development of Osteoporosis in patients with T2DM (OR 1.18, 95% CI 0.56-2.51). However it was seen that T2DM patients with older age had 1.08x odds of having osteoporosis (95% CI 1.01-1.16), and T2DM patients who have hypertension have 2.37x increased risk of developing osteoporosis (95% CI 1.05-5.36). Biguanide use among T2DM patients reduces risk of osteoporosis by 60% (95% CI 0.17-0.9).

Conclusion: Glycemic control did not present any association with the risk of developing Osteoporosis in Filipino patients with Type 2 Diabetes Mellitus. However, other coexisting factors such as increased age, presence of Hypertension and Biguanide use could be considered as independent risk factors for the development of Osteoporosis.

Benjamin Lopez¹, Robert Meertens², Michael Grundy², Benjamin Crone¹, Richard McWilliam¹

¹IBEX Innovations, Explorer 2, Netpark, Sedgfield, UK

²Medical Imaging, University of Exeter, Exeter, UK

PRE-CLINICAL STUDY EVIDENCING AN OPPORTUNISTIC SCREENING APPROACH IN SECONDARY CARE TO IMPROVE PRIMARY CARE REFERRAL FOR PATIENTS AT HEIGHTENED FRACTURE RISK

Background: The osteoporosis diagnosis gap often results in patients suffering several fractures before diagnosis. Fracture liaison services are highly effective but are limited to secondary prevention and UK coverage is incomplete.

Objective: Pre-clinical study informing an opportunistic screening approach in secondary care for patients undergoing a wrist X-ray.

Results from an asymptomatic patient group are reported, along with future direction.

Materials and Methods: A 261-patient single centre, non-randomised prospective study was conducted on asymptomatic patients recruited from the general over 50s population. Patients received bilateral wrist X-rays and reference bilateral wrist, pelvis and lumbar spine Dual-energy X-ray Absorptiometry (DXA) scans. An X-ray based method for determining areal bone mineral density and T-score was applied to wrist X-rays and area under the receiver operating characteristic curve (AUC) was assessed for: (1) identification of osteoporosis at the examination sites (ultra-distal radius (UD) and distal-third region (DT)) and (2) prediction of osteoporosis at the femoral neck based on the wrist X-ray, plus age and sex. *Results:* Osteoporosis was identified at UD and DT reference sites with 0.9588 (99% confidence intervals (CI) [0.9342,0.9794]) and 0.9766 (99% CI [0.9642,0.9889]) respectively when compared to reference DXA scans. A prediction of osteoporosis based on the wrist X-ray, plus age and sex demonstrated AUC=0.857 (99% CI [0.801, 0.912]).

Discussion: Performance is believed to be at, or above the level of a clinically useful opportunistic screening test.

Since opportunistic screening can be applied to any wrist radiograph, this opens the opportunity for both increased treatment numbers and equity of care by identifying patients from all socio-economic backgrounds attending trauma and general radiology who are at heightened fracture risk. A new care pathway and clinical study design will be presented which seeks to evidence these improvements in real clinical practice.

Conclusion: The results presented suggest a path forward for a genuinely opportunistic method of increasing both the absolute number and equity of primary care follow up and treatment.

Conflicting Interests: IBEX Innovations Ltd is the device manufacturer of the IBEX BH product and has an interest in its adoption within the NHS

Alison Gowdy¹, Rebecca Low², Antony Panayiotidis³, Tracey Marriott¹, Muhammad Javaid^{2,4}

¹Oxford Academic Health Science Network, AHSN, Oxford, UK

²Oxfordshire Osteoporosis and Metabolic Bone Disease service, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

³PRIMIS, University of Nottingham, Nottingham, UK

⁴NDORMS, University of Oxford, Oxford, UK

PRIMARY CARE BASED OPTIMISATION OF ANTI-OSTEOPOROSIS MEDICATION ADHERENCE: GRASP OSTEOPOROSIS

Background: Fracture Liaison Services (FLS) are expected to reduce fractures but poor anti-osteoporosis medications (AOMs) adherence limits their effectiveness. Primary care IT systems present an opportunity to improve AOMs adherence.

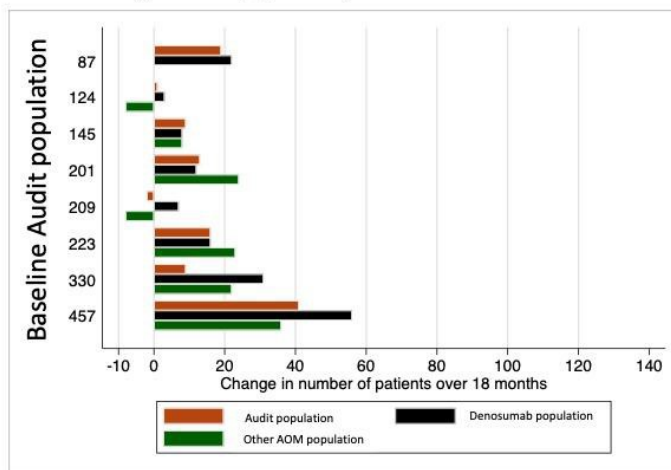
Objective: Describe the impact of a primary care adherence programme on AOM use and adherence.

Methods: A primary care AOM adherence programme was developed with experts from the University of Oxford, PRIMIS and the Oxford AHSN. It includes an EMIS-based search tool to flag adults with a history of fracture when aged 50 years and over and a prescription for an AOM in the last 5 years, but no prescription of an oral AOM for more than 3 months or denosumab for more than 6 months. Selected practices can also access online osteoporosis resources and quarterly calls with the local secondary care lead. Each practice ran five reports over 18 months between August 2021 and December 2022 to identify non-adherent patients requiring a medication review.

Results: Eight practices agreed to take part (median practice size 11,963 (range 4,423 to 40,499)). At baseline, there was significant variability between practices in the use of oral AOM (48%-70%) and denosumab (20%-32%) in the audit cohort. At the end of the project, QOF fracture coding increased by 21%, with an additional 252 patients on AOM therapy and a small nonsignificant increase in adherence to oral AOMs and denosumab between practices.

Discussion: The pilot demonstrated increases in QOF fracture coding, AOM prescribing and AOM adherence. Extrapolation to a general population of 1 million patients would lead to an additional 32,266 patients treated with AOM, with an estimated 1,162 avoided fractures (including 465 hip fractures) over 2 years. The reduction in hip fractures alone equates to a saving of £6,585,795 over 2 years. These findings support extending the programme to other primary care services.

Absolute change in audit population, denosumab and other AOM users from August 2021 to December 2022



Legend: Each row group is a different practice with the number representing the eligible audit population. E.g. 87 is the number of eligible patients for the service improvement project in the first GP practice

Conflicting Interests: In last three years received honoraria, unrestricted research grants, travel and/or subsistence expenses from: Amgen, Kyowa Kirin Hakin, UCB, Abbvie, Besin Healthcare, Sanofi

Muhammad Javaid¹, Tim Jones², Stephen Hepworth³

¹NDORMS, University of Oxford, Oxford, UK

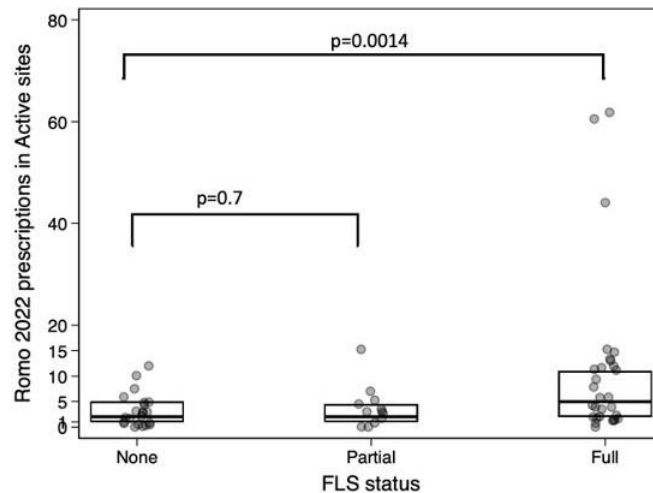
²Market Access and External Engagement department (British and Irish Isles), UCB BioPharma SPRL, Brussels, Belgium

³Immunology and Bone department, UCB BioPharma SPRL, Brussels, Belgium

UK RATES AND DETERMINANTS OF ROMOSUZUMAB PRESCRIPTIONS IN 2022: A NEED FOR GREATER ACTION

Background: Romosozumab rapidly reduces fracture risk and was recommended as a first-line option for post-menopausal persons with severe osteoporosis and a recent major fracture from November 2020 (Scotland) and May 2022 (England, Northern Ireland and Wales). **Objective:** Describe hospital-level romosozumab prescriptions across the four nations in 2022. **Methods:** Hospital-level romosozumab prescription data were analysed by country, and, as indicators of local patient need, the population of women aged 50 years and over and local FLS status (none, partial, full) and, in England and Wales, the number of patient records submitted to the mandatory national audits for Fracture Liaison Service (FLSDB) and National Hip Fracture Database (NHFD) in 2021. Zero-inflated Poisson models identified independent determinants of: a) any prescription and b) the number of prescriptions. **Results:** 152 sites were included (England-126, N. Ireland-5, Scotland-14, and Wales-7) with 60 full and 28 partial FLSs. 63 sites recorded a least one romosozumab prescription in 2022. The proportion of hospitals with any prescription varied from 20% in Northern Ireland to 64.3% in Scotland. No determinants of any prescription were identified. With England as the referent group, the number of prescriptions was greater in Scotland ($p=0.001$) and lower in N. Ireland ($p<0.001$). After adjusting for the number of women aged 50 years and over ($p=0.008$), a full FLS but not partial FLS predicted the number of prescriptions (Figure). In England and Wales, the number of prescriptions was predicted by the local number of FLSDB ($p=0.001$) but not NHFD ($p=0.6$) records submitted.

Romosozumab prescriptions in 2022 in active sites by FLS status



Discussion: In 2022, the local availability of romosozumab was not predicted by measures of patient need. Once available, hospital prescriptions were associated with the number of women aged 50 years and over and FLSDB submissions. More support is needed to increase the number of sites implementing romosozumab and matching local delivery to local needs. **Conflicting Interests:** MKJ had received honoraria, unrestricted research grants, travel and/or subsistence expenses from: Amgen, Kyowa Kirin Hakin, UCB, Abbvie, Besin Healthcare, Sanofi SH and TJ are employees of UCB

Jane Fleming^{1,2}, Daniel Chappell^{2,3}, Karen Willoughby^{2,4}, Judith Brown^{2,3}, Adam Wagner⁵, Emma Clark⁶, Lee Shepstone⁵, Tom Turmezei^{4,5,7}, Stephen Kaptoge^{1,8}, Kenneth Poole^{2,3,4}

¹Cambridge Public Health, University of Cambridge, Cambridge, UK

²Department of Rheumatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK

⁴Department of Medicine, University of Cambridge, Cambridge, UK

⁵Norwich Medical School, University of East Anglia, Cambridge, UK

⁶Clinical Science at North Bristol, University of Bristol, Bristol, UK

⁷Department of Radiology, Norfolk and Norwich University Hospital NHS Trust, Norwich, UK

⁸Department of Public Health and Primary Care, University of Cambridge, Cambridge, UK

USING STANDARD COMPUTERISED TOMOGRAPHY (CT) SCANS FOR OPPORTUNISTIC IDENTIFICATION OF OSTEOPOROSIS AND VERTEBRAL FRACTURES: VIEWS OF OLDER PATIENTS

Background: Computed tomography (CT) scans including spine/hip views can be re-purposed to measure bone density and identify vertebral fractures, thus avoiding need for DEXA or spinal x-ray appointments and further radiation exposure. Up to 40% of all diagnostic CTs include spine/hip imaging. Estimated prevalence of osteoporosis or vertebral fractures among older people having such scans is about 30%. This patient subgroup has higher than population average fracture risk and could potentially benefit from identification and treatment of osteoporosis following opportunistic detection on CT. However, with other health concerns, their attitudes towards having additional investigations for osteoporosis are unknown.

Objective: To understand perspectives of older people offered fracture risk assessment and bone health checks using their CT scans.

Methods: Qualitative study conducted alongside a randomised pragmatic feasibility study, PHOENIX-f (Picking up Hidden Osteoporosis Effectively during Normal CT Imaging without additional X-rays). Covid-19 restrictions changed trial recruitment: instead of in-person approaches, information packs were used inviting patients to self-complete a FRAX questionnaire and consent form or give reasons for declining. Purposive sampling was used to recruit an interview sample representative of the full study sample in demographics and disability, with over-sampling of patients recommended osteoporosis treatment. Analyses code patient perceptions to Theoretical Framework of Acceptability of Healthcare Intervention domains (Sekhon 2017).

Results: Interviewees (n=24, 65-86 years, 63% women) felt measuring fracture risk and bone health while attending diagnostic/staging CT was appropriate. Self-consent was acceptable. Perspectives on potentially receiving a new osteoporosis diagnosis in addition to anticipated CT results ranged from thankfulness that osteoporosis had been identified and treatment started, to concern or unconcern over insufficient information or lack of GP follow-up.

Discussion: Attitudes towards opportunistic bone health screening at CT attendance were generally positive, likely influenced by interviewees' willingness to participate. Acceptability of self-consent suggests bone health screening at CT need not require additional staffing to enroll patients face-to-face. Responses from patients who gave reasons for declining and interviews with staff who approached them (researchers/nurses/receptionists) highlight the burden of other health concerns being a reason for non-participation. *Conclusion:* Older patients who accepted bone health checks at CT generally thought these were a "good idea".

D Chappell¹, J Brown¹, V Sanders¹, J Boylan², J Turton², R Barbary³, Y Arlachov³, B Khan⁴, A Guy⁴, S Sampson⁴, R Eckert⁵, O Sahota³, N Harvey⁴, M Stone², K Poole¹, M Javaid⁵

¹Department of Rheumatology, Cambridge University Hospitals NHS FT, Cambridge, UK

²Cardiff and Vale University Health Board, Cardiff, UK

³Nottingham University Hospitals NHS Trust, Nottingham, UK

⁴University Hospitals Southampton Foundation Trust, Southampton, UK

⁵NDORMS, University of Oxford, Oxford, UK

MULTI-SITE RADIOLOGICAL REPORTING OF VERTEBRAL FRACTURES IN CT IMAGING – THE ADOPT STUDY

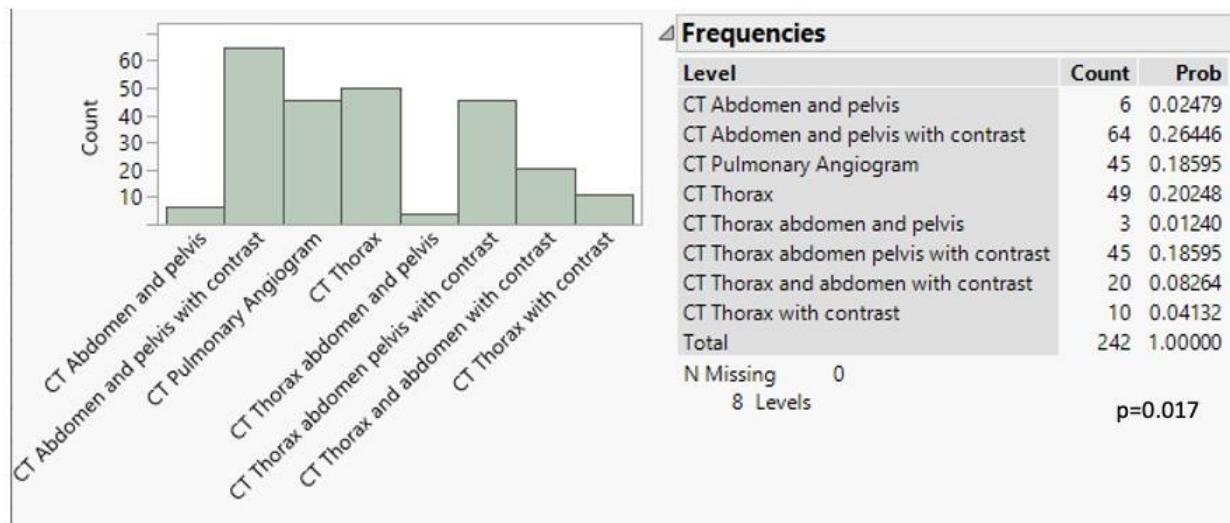
Background: Fewer than 30% of vertebral fragility fractures (VFs) present on routine clinical CT scans are reported. As VFs can increase the risk of mortality, morbidity and fracture risk, it is essential VFs are detected as early as possible.

Objective: To compare the routine radiology reporting of VF against the Royal Osteoporosis Society (ROS) guidelines

Methods: 500 consecutive CT scans were retrieved by each site from 2017 that included imaging of the spine. All patients were assessed for vertebral fractures from sagittal imaging by a clinician with local radiologist adjudication. For each scan, the clinician recorded if a VF was present, was a VF(s) mentioned in the clinical report? and did the clinical report use the term ‘vertebral fracture’?

Results: The scans for 2000 patients (49.7% women) were audited. A total 242 (12.1%) (vertebral fracture patients) were identified in the audit, M=113, F=129). Radiologists mentioned a VF in 55% of reports and correctly using the term “Vertebral fracture” 29.3% of reports however only 9 (3.7%) vertebral fractures were recommended for further assessment. The prevalence of VF varied between scans from 1.2 to 26.4% (p=0.0X) (Figure)

Distribution of VF patients by Exam type



Discussion: A clinically significant care gap remains in the reporting and actioning of VF in routine NHS healthcare. Opportunistic VF reporting in CT using AI technologies, linked to Fracture Liaison Services have the potential for substantial patient benefit.

R Sreshtha¹, A Johansen², C Gregson³, R Eckert⁴, Z Mohsin¹, R Pinedo-Villanueva¹, M Sanchez¹, M Javaid¹, M Sanchez¹

¹NDORMS, University of Oxford, Oxford, UK

²University Hospital of Wales and School of Medicine, Cardiff University, Cardiff, UK

³Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK

⁴Fracture Prevention Service, Oxford University Hospitals NHS Foundation Trust, Oxford, UK

PREDICTING HIGHER PERFORMING FRACTURE LIAISON SERVICES: A CLUSTER ANALYSIS OF THE FLSDb AUDIT OF ENGLAND AND WALES

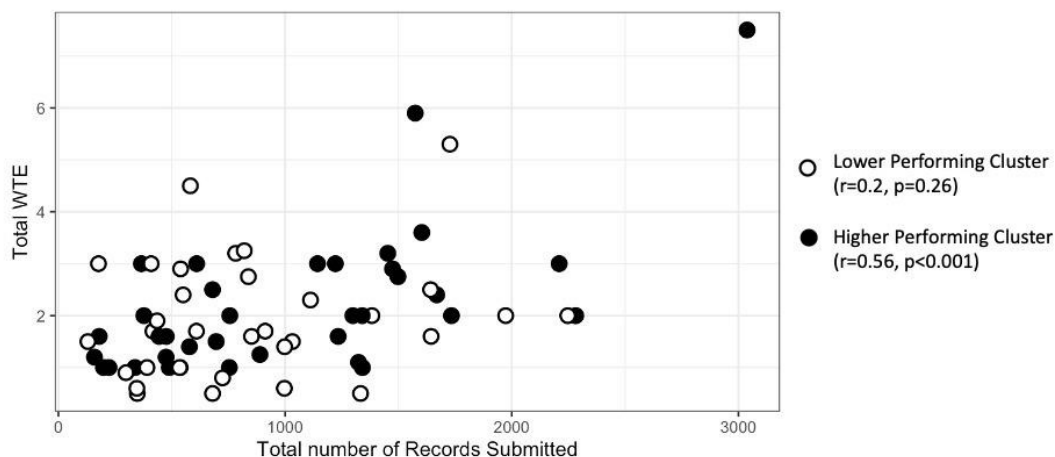
Background: Fracture Liaison Services (FLSs) function within complex secondary and primary care healthcare systems. This challenges optimal FLS delivery of effective secondary fracture prevention. There is little evidence to guide FLS on the organisational structures associated with optimal performance.

Objective: Describe the organisational predictors of effective FLS performance.

Methods: We used 2020 data from the FLS Database for England and Wales, a mandatory national audit, specifically annual organisational audits and individual patient records mapped against ten key performance indicators (KPIs). We used K-means clustering to identify the optimal number of KPI clusters of FLSs. Differences between clusters for performance indicators and organisational characteristics were tested using the Wilcoxon rank-sum test, Fischer's exact test and Spearman correlations.

Results: There were 68 FLSs with organisational audit data available. Using K, The optimal number of KPI clusters identified was 2 (cluster A n=35 (51.5%), B n=33 (48.5%)). When comparing the individual KPIs between clusters, cluster B was higher performing with a significantly higher percentage of falls assessment (90 vs 53%, $p=0.005$) and KPIs related to the monitoring of treatment recommendations ($p<0.001$). Of the organisational predictors, a higher banded administrator predicted a better-performing cluster (band 3: 75% vs 30%, $p=0.017$). A significant association between total whole-time equivalent nurse/ administrator and allied health professionals and the number of patient records submitted was only seen in the higher-performing cluster (figure).

Association between total number of FLS-DB records submitted in 2020 by FLSs and total whole time equivalent for nurses, administrators and allied health professionals



Discussion: Using real-world data, we have demonstrated significant differences in performance related to the monitoring KPI. Higher performing FLSs have a clear association between caseload and whole-time equivalents of staff. These findings suggest prioritising FLS resourcing according to the local patient volume is important for improving FLS effectiveness.

Daniel Chappell^{1,2}, Judith Brown^{1,2}, Viki Sanders^{1,2}, Emma Gerety³, Kenneth Poole^{1,2,4}

¹Department of Rheumatology, University of Cambridge, Cambridge, UK

²NIHR Cambridge Biomedical Research Centre, Cambridge Biomedical Research Centre, Cambridge, UK

³Department of Radiology, University of Cambridge, Cambridge, UK

⁴Department of Medicine, University of Cambridge, Cambridge, UK

VXP: A NOVEL VERTEBRAL FRAGILITY FRACTURE RADIOLOGY REPORTING CODE FOR IMPROVING OSTEOPOROSIS SCREENING AND SECONDARY PREVENTION IN ROUTINE CT SCANS

Background: There is a need for a simple method for the reporting and management of VFs in clinical practice. Incidental vertebral fragility fractures (VFs) in routine CT imaging are not always identified by Fracture Liaison Services (FLS) or Osteoporosis services, even if reported by a radiologist.

Objective: To determine if a using a 3-letter code 'VXP' in CT radiology reports to signify grade 2/3 (moderate/severe) VFs, improves osteoporosis identification and treatment outcomes.

Method: Radiologists were asked to report all routine clinical CT scans using VXP as a code for moderate/severe VFs. A member of the Metabolic Bone team searched "VXP" using a simple radiological report text search engine. A list of VXP patients was then exported and assessed. VXP patients were not followed up if it was found that patient had; 1) VF from trauma, 2) ongoing cancer treatment, 3) previous DEXA or previous treatment within 2 years, 4) already been assessed by Metabolic Bone or FLS. Remaining VXP patients had QCT (areal femoral neck) bone density measured using the original CT scan if technically possible, and treatment advice generated. Some of these patients were referred for spine DEXA by the clinical lead. The treatment outcomes were recorded between January 2021 and October 2021.

Results: In the first 8 months of implementation, 758 patients were identified using the VXP code. Of these, 152 patients underwent BMD analysis and 103 (14%) were advised treatment. DXA had already been done/treatment already started in 259. In a further 177, fracture was traumatic, the patient had died, or they were already reviewed by metabolic bone/FLS. For 108 metalwork, imaging characteristics or a grade 1 (mild) fracture led to no further action.

Conclusion: VXP is an innovative and simple reporting method for the screening of VFs from CT. in 8 months, 103 patients were offered osteoporosis medication to help prevent further VFs in these vulnerable patients. A further study into the effectiveness of VXP compared against usual care is recommended.

Elizabeth Orhadje, Kathryn Berg, Karen Whitehead, Barbara Hauser, Stuart Ralston

¹Centre for Genomics and Experimental Medicine, University of Edinburgh, Edinburgh, UK

MATERNAL FAMILY HISTORY OF OSTEOPOROSIS IS COMMON IN WOMEN WITH PREGNANCY ASSOCIATED OSTEOPOROSIS AS COMPARED WITH CONTROLS

Background: Pregnancy Associated Osteoporosis (PAO) is a rare disorder typically presenting with multiple vertebral fractures during pregnancy or in the puerperium. It has been previously reported that individuals with PAO have a family history of osteoporosis more often than in controls but the studies to date have small.

Objective: To determine how frequently individuals with PAO report a family history of osteoporosis as compared with controls

Methods: Individuals with a self-reported history of PAO were recruited through a web-based survey which collected information on the mode of presentation, possible risk factors including family history of osteoporosis, treatment and quality of life. Each participant was asked to identify someone who had a pregnancy around the same time who had not experienced PAO to act as a control.

Results: We recruited 152 individuals with PAO and 124 controls. Details are shown in the table. The average age was about 40 years for both groups at time of completing the survey. Individuals with PAO were significantly more likely to have maternal and grand-maternal history of osteoporosis overall as compared with controls. Maternal spine fractures were also more common in cases, but this did not reach significance. There was no difference in paternal or grand-paternal history of osteoporosis between groups, but this was reported rarely in both groups.

Discussion: This survey indicates that a maternal history of osteoporosis is much more common in people with PAO than controls which is consistent with a role for genetic factors in predisposition. Future research in this cohort is planned to look at genetic determinants of bone density to explore this in more detail.

Conclusion: This study suggests that genetic factors play a contributory role in the pathogenesis of PAO.

	<i>Case (n = 152)</i>	<i>Control (n = 124)</i>	<i>p-value, Odds ratio [95% CI]</i>
Age at survey completion	40.2 ± 9.8	42.0 ± 11.3	p=0.15
Paternal vertebral fracture	5 (3.3%)	3 (2.4%)	p=0.67, 1.37 [0.32 – 5.85]
Paternal hip fracture	2 (1.3%)	0 (0%)	p=0.36, -4.16 [0.20 – 87.5]
Maternal vertebral fracture	10 (6.6%)	4 (3.3%)	p=0.22, 2.11 [0.65 – 6.90]
Maternal hip fracture	3 (2.0%)	3 (2.4%)	p=0.81, 0.82 [0.12 – 4.12]
Paternal osteoporosis	9 (5.9%)	2 (1.6%)	p=0.09, 3.82 [0.81 – 18.11]
Grand-paternal osteoporosis	4 (2.6%)	1 (0.8%)	p=0.29, 3.32 [0.37 – 30.13]
Maternal osteoporosis	47 (30.9%)	15 (12.1%)	p=0.0003, 3.25 [1.72 – 6.17]
Grand-maternal osteoporosis	37 (24.3%)	14 (11.3%)	p=0.01, 2.39 [1.22 – 4.69]

Table: Values are mean and standard deviation or number and percentages.

R Shreshtha¹, S Hawley¹, A Delmestri¹, B Kishore², S Bowcock³, M Sanchez¹, D Prieto-Alhambra¹, K Ramasamy⁴, MK Javaid¹

¹NDORMS, University of Oxford, Oxford, UK

²Department of Haematology, University Hospitals Birmingham, Birmingham, UK

³Department of Haematology, Kings College London, London, UK

⁴Department of Haematology, Oxford University Hospitals NHS Trust, Oxford, UK

IMMINENT FRACTURE INCIDENCE AMONG INDEX FRACTURE PATIENTS WITH MULTIPLE MYELOMA: A PARALLEL COHORT STUDY OF THE UK CPRD GOLD

Background: It is established that patients with multiple myeloma (MM) present with fragility fractures, it is not known if the risk of subsequent fracture is different from adults without MM. **Objective:** To describe the imminent fracture rate (IFR) within one and two years after an index fracture among MM patients compared to patients without MM. **Methods:** The Clinical Practice Research Datalink GOLD was used to identify a cohort of MM patients (1995-2017), with a cohort of non-MM patients matched on age, gender and GP practice at date of MM diagnosis. MM patients diagnosed with an index fracture between two years prior to index date and up to two years after were flagged and followed from date of first fracture to the earliest of either subsequent fracture at a major site (hip, spine, forearm & humerus), death, transference out of practice or two years after first fracture. Cumulative incidence at one and two years after index fracture were estimated accounting for the competing risk of death, adjusting for age and gender. **Results:** 1,963 MM patients were matched to 6,353 controls (mean age 69 years, 45% female). From these cohorts, 281 MM and 300 control patients had an index fracture and were eligible for the IFR analysis. The mortality at 2 years after index fracture was significantly higher in MM patients (14.5%) vs in controls (2.8%). The proportion with a subsequent fracture was higher in the MM group compared to controls. The subsequent fracture incidence was higher in MM compared with controls (Table) with a higher subsequent vertebral fracture rate within 12 months of fracture.

Imminent fracture risk among patients with index fracture at any site: stratified by myeloma case or control status								
Imminent fracture outcome following first incident fracture during follow-up	Myeloma cohort (n=280)		Non-myeloma cohort (n=293)		Age & sex adjusted sub hazard ratio			
	N	Cumulative Incidence: % (95%CI)*	N	Cumulative Incidence: % (95%CI)*	sHR	Lower 90% CI	Upper 95% CI	P-value
Within 6 months								
Any OP site	7	2.51 (1.12 - 4.87)	10	3.44 (1.76 - 6.0)	0.68	0.26	1.74	0.42
Hip	6	3.5 (1.45 - 7.07)	0					
Non-hip	18	6.45 (3.97 - 9.75)	25	8.62 (5.75 - 12.21)	0.82	0.44	1.54	0.537
Spine	2	0.72 (0.15 - 2.4)	1	0.35 (0.03 - 1.82)	2.07	0.2	22.4	0.55
Within 1 year								
Any OP site	40	13.0 (9.4 - 17.2)	37	14.5 (10.6-18.9)	1.24	0.8	1.95	0.35
Hip	6	3.5 (1.5 - 7.1)	3	2.0 (0.5 - 5.3)	1.84	0.60	5.82	0.3
Non-hip	36	13.0 (9.4 - 17.3)	32	11.2 (7.9 - 15.2)	1.3	0.80	2.10	0.292
Spine	9	3.27 (1.61 - 5.87)	2	0.71 (0.14 - 2.35)	4.9	1.10	21.78	0.037
Within 2 years								
Any OP site	52	19.1 (14.6 - 23.9)	44	15.7 (11.7 - 20.2)	1.37	0.91	2.06	0.127
Hip	8	4.8 (2.3 - 8.8)	5	3.5 (1.3 - 7.4)	1.52	0.59	3.90	0.386
Non-hip	48	17.6 (13.4 - 22.4)	36	12.7 (9.2 - 16.9)	1.54	0.99	2.40	0.054
Spine	16	5.9 (3.5 - 9.1)	2	0.7 (0.14 - 2.35)	9.14	2.13	39.32	0.003

* Cumulative incidence function, taking into account competing risk of death

^ Defined as hip, spine, humerus and wrist/forearm

Discussion: IFR is even higher in patients with recent diagnosis of MM, identifying a sub-group of adults with fragility fracture patients that should be prioritised for rapid initiation of secondary fracture prevention interventions.

Kathryn Berg, Elizabeth Orhadje, Karen Whitehead, Barbara Hauser, Stuart Ralston
1Centre for Genomics and Experimental Medicine, University of Edinburgh, UK

PREGNANCY ASSOCIATED OSTEOPOROSIS IS ASSOCIATED WITH SUBSTANTIALLY REDUCED QUALITY OF LIFE IN THE SHORT AND LONG TERM

Background: Pregnancy Associated Osteoporosis (PAO) is a rare disorder typically presenting with multiple vertebral fractures during pregnancy or in the puerperium. The effects of PAO on quality of life (QoL) have been little studied.

Objective: To evaluate the effects of PAO on quality of life.

Methods: Individuals with a self-reported history of PAO were recruited through a web-based survey which included five questions from the Short Form 36 Health Survey Questionnaire (SF-36). Each participant was asked to identify someone who had a pregnancy around the same time but who had not experienced PAO to act as a control. Participants were asked to complete the questions in retrospect at the time of their pregnancy and at the current time.

Results: The average (SD) age of women with PAO at the time of recruitment was 40.2 (9.8) years and of controls 42.0 (11.3) years ($p = 0.15$). The time between the affected pregnancy and survey response in the PAO cases was 7.4 (9.8) years compared with 10.3 (11.7) years in the controls ($p = 0.02$). The QoL results are summarised in the table. Women with PAO had significantly lower scores in all domains at the time of the original presentation as compared with controls. Mean QoL increased with time in the PAO group ($p = <0.001$) and remained stable in controls ($p = 0.389$). Despite this improvement, QoL remained significantly lower in PAO cases versus controls at the time of survey response (mean 7.4 years later).

Discussion: Women with PAO have substantially reduced quality of life compared with controls at the time of diagnosis. While this improves with time, possibly as the result of fracture healing, those affected by PAO continue to have reduced quality of life in the long term.

	<i>PAO Cases (N = 152)</i>	<i>Controls (N = 124)</i>	<i>p-value</i>
Quality of life at the time of PAO diagnosis or pregnancy in controls			
Felt Calm and Peaceful	21.6 ± 24.8	66.5 ± 21.5	<0.0001
Had a lot of Energy	18.2 ± 20.7	56.6 ± 22.1	<0.0001
Felt Depressed	41.5 ± 31.9	87.7 ± 18.8	<0.0001
Health Interfered with Social Activities	20.6 ± 27.8	84.6 ± 24.1	<0.0001
Mean QoL Score	25.5 ± 28.2	74.0 ± 25.1	<0.0001
Quality of life at the time of completing the survey			
Felt Calm and Peaceful	55.2 ± 24.3	66.2 ± 18.6	0.0002
Had a lot of Energy	48.1 ± 26.6	61.0 ± 17.8	<0.0001
Felt Depressed	72.6 ± 24.3	83.9 ± 17.8	<0.0001
Health Interfered with Social Activities	63.6 ± 34.8	89.8 ± 17.5	<0.0001
Mean QOL Score	59.8 ± 29.2	75.2 ± 21.4	<0.0001

Table : Adjusted quality of life scores for cases and controls, showing mean and standard deviation. Lower values indicate poorer quality of life.

M Javaid¹, Z Mohsin¹, A Johansen², C Gregson³, R Pinedo-Villanueva¹

¹NDORMS, University of Oxford, Oxford, UK

²University Hospital of Wales and School of Medicine, Cardiff University, Cardiff, UK

³Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK

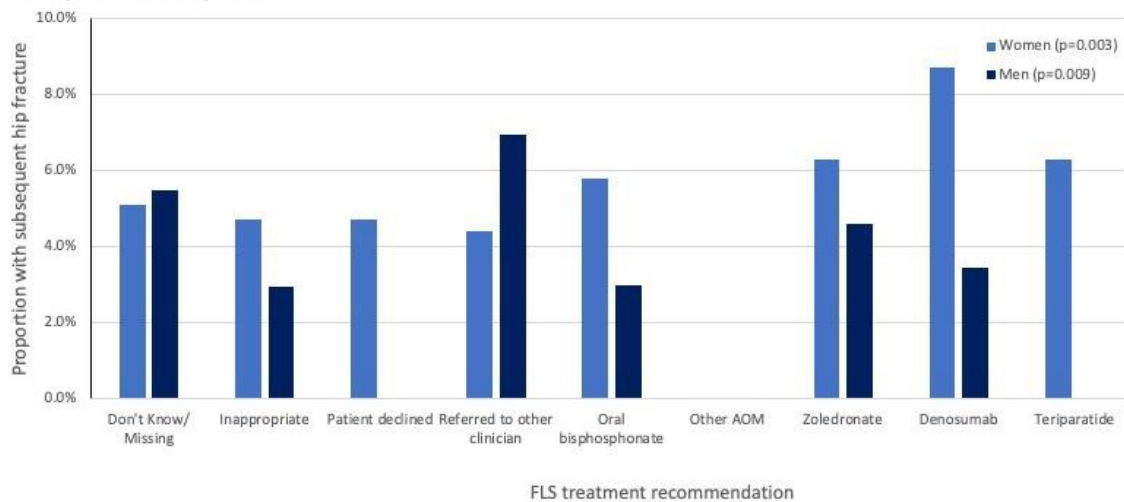
SUBSEQUENT HIP FRACTURES IN PATIENTS IDENTIFIED BY A FRACTURE LIAISON SERVICE (FLS) IN ENGLAND AND WALES – LINKAGE OF THE NATIONAL FLS AND HIP FRACTURE DATABASES

Background: Fracture Liaison Services (FLSs) are clinically and cost effective in reducing fracture risk in adults with recent fragility fractures and, are being implemented internationally to improve patient outcomes and reduce healthcare costs. However, there are few real-world data determining whether particular subgroups of patients remain at high imminent fracture risk after a standard FLS management.

Method: A cohort of 50,214 patients from the national FLS database with an index fracture of the hip, spine, or other site in England and Wales in 2017 was linked to the National Hip Fracture Database from 2017 to 2020 to identify those patients who had a subsequent hip fracture in the next few years.

Results: One in twenty (5.1%) of the 9,888 people with an index hip fracture was at the hip went on to sustain a second hip fracture within 3 to 4 years despite receiving the support of an FLS. The risk of hip fracture was similar (4.7%) if the index fracture had been at the spine, but lower when index fractures had occurred at other sites (2.8%, p for difference by index fracture sites <0.001). The proportion of patients with a subsequent hip fracture did not differ by the type of anti-osteoporotic medication recommended after the first fracture (Figure).

Proportion with a subsequent hip fracture by anti-osteoporosis medication recommended by the FLS, in patients with an index hip fracture by sex



	n	Don't know/ missing	Inappropriate	Patient declined	Referred	Oral Bisphosphonate	Other Anti-osteoporosis medication (AOM)	Zoledronate	Denosumab	Teriparatide
Women	7,040	1,287	1,091	85	1,149	2,047	20	773	572	16
Men	2,847	565	578	43	505	659	18	305	174	0

Discussion: These findings highlight the need to identify and manage adults at high imminent fracture risk, including more potent anti-osteoporosis management strategies that rapidly decrease of subsequent hip fracture risk.

Conflicting Interest: This work was funded by an investigator initiated grant from UCB and a project grant from the Royal Osteoporosis Society

Rita Patel¹, Petra Baji¹, Jill Griffin², Sarah Drew¹, Tim Chesser³, M.Kassim Javaid⁴, Xavier Griffin⁵, Yoav Ben-Shlomo⁶, Elsa Marques¹, Andrew Judge¹, Antony Johansen⁷, **Celia Gregson¹**

¹Musculoskeletal Research Unit, Bristol Medical School, University of Bristol, Bristol, UK

²Clinical Engagement, Royal Osteoporosis Society, Bath, UK

³Department of Trauma and Orthopaedics, North Bristol NHS Trust, Bristol, UK

⁴Nuffield Department of Orthopaedics, University of Oxford, Oxford, UK

⁵Division of Orthopaedics, Queen Mary University of London, London, UK

⁶Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

⁷School of Medicine, Cardiff University and University Hospital of Wales, Cardiff, UK

PATIENT RECOVERY FOLLOWING HIP FRACTURE IS ASSOCIATED WITH MULTIPLE MODIFIABLE COMPONENTS OF HOSPITAL SERVICE DELIVERY IN ENGLAND AND WALES: THE REDUCE RECORD-LINKAGE COHORT STUDY

Background: Substantial variations remain in the delivery of hip fracture care across the United Kingdom despite well-established standards and guidelines. We aimed to predict adverse patient outcomes following hip fracture from modifiable hospital-level organisational factors and use findings to develop implementation tools to improve national hip fracture service delivery.

Methods: We used a national record-linkage cohort of 178,757 patients (age ≥ 60 years) with a hip fracture in England and Wales (2016–19). We linked patient-level hospital admissions, National Hip Fracture Database and mortality data with 231 metrics from 18 hospital-level organisational-level audits and reports. Multilevel models identified organisational factors, independent of patient case-mix, associated with patient outcomes: length of hospital stay, emergency 30-day readmission, 120-day mobility recovery, days in hospital and health costs over 365-days, and mortality (30- and 365-day) in 172 hospitals across England and Wales.

Results: Over one-year patients with mean (SD) age 83 (8.6) years, spent 31.7 (32.1) days in hospital, costing £14,642 (£9,017), and 50,354 (28.2%) died. We identified 46 key organisational factors independently associated with one or more patient outcome, of which 13 were (a) associated with cost and/or bed-day savings over one year, (b) consistently associated with other positive patient outcomes, and (c) potentially modifiable. Factors included weekend physiotherapy provision (mean saving per patient/year: £676 [95% CI: £67-1285]), orthogeriatrician assessment (£529 [£148-910]), direct admission to a hip fracture ward (3.4 [-0.36-7.07] days), regular dissemination of audit data to staff (0.85 [0.30-1.39] days). These data have informed the development of a hospital-specific cost-benefit calculator, with model business cases for service improvement, specialty checklists, audit and 'how to' guides for complex care delivery.

Conclusion: All hospitals should try to provide the best available hip fracture care equally across England and Wales. We identified multiple, potentially modifiable, organisational factors associated with important patient outcomes following hip fracture. Our practical and freely-available toolkit should help reduce variation in service delivery.